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THE PRESENT STATUS OF VITAMINES[1]

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It is not a simple undertaking to summarize even the more important points in the recent literature on vitamines, because the subject has been developing very fast during the last few years, and parts of it are still much in debate. Information has been gained not only from laboratory research but from observations of the tragic human experience with inadequate war diets.

The material is considered under the headings of the three vitamines now recognized. Fat-soluble *A*, for a number of years known to be present in butter fat, cod-liver oil, green leaves, and certain other foods, is necessary for normal growth and in its absence from the diet there often develops an eye disease known as xerophthalmia or keratomalacia. Water-soluble *B*, fairly widely distributed in plants, is necessary for growth and also for prevention of polyneuritis or beri-beri. Water-soluble *C*, the latest of the three to be recognized, is the antiscorbutic vitamine.

[1] The demand for this paper, first published in January, 1920, has been so great that the reprints have been exhausted for some time. It has been revised therefore and in part rewritten to carry the review of the literature roughly through the year 1920, and reprints will be available.

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FAT-SOLUBLE A

Effect of Lack of A in the Diet. Dr. H. Gideon Wells,[2] of the Department of Pathology of the University of Chicago, who served in Roumania under the Red Cross, tells a dramatic story showing the need of this vitamine for children. The scanty diet in Roumania, when he arrived, consisted of little more than a limited amount of corn-meal and quantities of a very thin bran-vegetable soup. There was no milk nor butter, for the Austrians had driven off the cows. Many of the children had eye disease, sometimes so severe as to cause blindness. There also was much of the distressing swollen condition known as war-edema, the latter probably due to the low calories and especially the low protein of the diet. Dr. Wells, at the height of his difficulties in getting food of any kind, learned of a vessel which had put into Archangel with cod-liver oil as its entire cargo. Through the efforts of the Red Cross all of it was sent down, and it saved the lives of many of the children. After their long fat starvation, they took readily what might have been refused under happier circumstances.

In Vienna, too, since the war, where the food conditions have been so desperate, eye troubles have developed in children, though not to such an extent, apparently, as scurvy. Dalyell (1), who with Chick was in Vienna for a number of months, speaks of a girl who had been having only 10 to 15 grams of milk fat daily and who developed severe eye trouble. She was given 10 grams cod-liver oil and 20 grams butter daily, and in 14 days her eyes had completely recovered and she had gained 300 grams in weight.

The need for fat-soluble *A* is not limited to children or young animals in general. Drummond (2), in London, has shown that as young rats approach maturity their requirement becomes markedly less. They can even live without it in apparently good health for considerable time, but sooner or later they lose weight and often have eye disease. They also show a distinct decrease in resistance to various infections, many deaths from infectious disease occurring. The older the young rats are the longer they can stand the inadequate diet before their decline. Dr. McCollum in his lectures has reported what he believes to be a similar pathological eye effect in adult human beings in certain northern lumber camps where the only fat is cured bacon and where the diet must be almost completely lacking in *A*. A condition known as

[2] Personal communication.

"night-blindness" is prevalent—a defect of eyesight not noticed by the non-reading laborer till the dim light of night. In the Madras Presidency, also, eye trouble, keratomalacia, is common among the ill-fed Indians, whose diet is made up of polished rice, vegetable oils, and condiments. The treatment is cod-liver oil, attention to hygiene of the eyes, and a more liberal dietary (1). "There is therefore every reason," says Drummond, "that great care should be taken to ensure that dietaries of adults contain an adequate supply of foodstuffs in which the fat-soluble *A* is present."

Rickets. Not only xerophthalmia but rickets may be connected with lack of the fat-soluble vitamine. It is improbable, however, that a deficiency of this vitamine alone produces rickets, or that the use of the term "anti-rachitic vitamine" is justified as synonymous with fat-soluble *A*, as some of the English investigators (3) believe. McCollum, Simmonds, and Parsons (4) report rachitic symptoms in their rats on several diets with several deficiencies combined. Low fat-soluble *A*, low calcium, poor protein, unsatisfactory salt combinations, acting together, may all contribute. Mellanby (5), one of the chief supporters of the antirachitic vitamine theory, finds that, "when the diet has a relatively good protein content and the animal is active, less antirachitic accessory factor is necessary." Mellanby cites figures of infantile mortality and rickets, both of which are very unusually low in a group of island children, for example, whose diet consists largely of fish, oatmeal, and eggs, especially fish liver, the two latter foods being rich in the "antirachitic accessory factor."

Hess and Unger (6) in New York are very definite in their belief that absence of *A* is not the cause of rickets. They find that rickets may develop in children on a diet rich in milk and cream, and not on a diet of highly skimmed dried milk, sucrose, orange juice (for *C*), autolyzed yeast (for *B*), cottonseed oil, and cream of wheat. This latter diet, however, according to Hopkins (1), may contain, in its large amount of skimmed milk, a quantity of *A* much higher than would be expected from its low fat content. Rickets seems to need further investigation before its etiology is completely established. Whatever its etiology, however, it can, with very few exceptions, be cured or prevented by cod-liver oil, which is almost a specific (1) (7).

Occurrence. The fat-soluble vitamine occurs in more foods than was at first thought, but in variable quantities. Butter fat is still regarded as the most important source, but the quantity (8) therein depends upon

the quantity of *A* in the feed of the cow and upon the manipulation of the butter itself. (See below in connection with stability.) Whale oil is another fairly rich source, though not so rich as butter. Drummond (9), with carefully standardized methods of feeding young rats and noting the change of weight, if any, week by week, found that he obtained about the same satisfactory growth when the fat-soluble *A* came wholly from 8 per cent butter fat or 20 per cent whale oil. Fish oils in general and fat fish may serve as valuable sources. Oleo oil, as shown by Osborne and Mendel several years ago, contains a fair amount of it, and so do oleomargarines made from oleo oil, but not the nut margarines made wholly from vegetable oils (10). However, as Steenbock (8) says, "Oleomargarines . . . . are not to be considered in the same class as good butter in providing the organism with the fat-soluble vitamine." Pig's liver oil, and liver tissue, kidney tissue, probably glandular organs in general (11) give fair supplies—that is, that portion of the animal of which we eat little is far superior to the skeleton muscle of which we eat much.

Contrary to the usually accepted idea in regard to the lack of *A* in lard and in vegetable oils, Daniels and Loughlin (12) have found very distinct amounts in lard and cottonseed oil, shown only when large quantities were fed. Their rats grew as well when the diet contained 28 per cent of these fats as with 5 per cent butter fat and 23 per cent other fat. The authors do not give information in regard to the color or the commercial treatment of their fats in preparation for the market. Drummond and Coward (13) have also reported the presence of *A* in a number of vegetable oils. Palm oil contains as much *A* as one third of that present in butter, while maize oil and cotton-seed oil contain still less.

But "the fat-soluble vitamine need not be sought solely in foods known to be rich in fats" (14). Many vegetables furnish rich sources of it, and their value is being more and more studied and appreciated. Dried spinach, alfalfa, clover, timothy, and tomato promote growth of rats just as satisfactorily as an equal small quantity of butter fat; possibly they are even better. Cabbage is not so good; potato contains only a small quantity of this vitamine. The dried green vegetables when extracted with U. S. P. ether gave a green oil equal to about 3 per cent of the dried plant, and as minute an amount as about a drop of this "spinach oil" or other oil fed daily restored normal growth in rats.

It is not only leaves that contain the fat-soluble vitamine but storage organs of plants as well. Carrots, sweet potatoes, even yellow corn, though lower in *A* than spinach and alfalfa, all contain sufficient amounts for satisfactory growth (15) (16). Peas (17) also have a small quantity and possibly bananas (18).

A very interesting generalization has been made by Steenbock (19) about the foods which contain this vitamine: they all contain yellow coloring matter. Butter, egg yolks, cod-liver oil are obvious examples. Oleo oil, the part of the beef fat which contains the vitamine, is yellow; the solid beef fat which lacks it is colorless. Of the commercial oleo oils which he has tested, those most highly pigmented are richest in the fat-soluble vitamine. Colored roots such as carrots and sweet potatoes have it, but sugar beets, mangels, dasheens, and Irish potatoes have little or none. It is probably present in orange juice but not in lemon or grape fruit (20). Spinach and grass, of course, have yellow associated with their chlorophyll, and the yellow separated from the green is found rich in the vitamine. Steenbock and Boutwell (21) made a deep green alcohol extract of alfalfa, saponified it with potassium hydroxide to decompose the chlorophyll and then extracted with ether, getting thus an orange-red extract which, on evaporation, furnished rats with a satisfactory source of *A*. The crystallized carotin isolated by Steenbock did not serve as a substitute for the vitamine, but carotin is a very labile substance and may have changed chemically in the process of removal. Rosenheim, Drummond, and Coward (13) (22) in London have confirmed and extended this view. They have found in liver tissue, besides carotin and xanthophyll, an unknown substance which gives certain lipochrome reactions and seems to be responsible for a much-used color test for cod-liver oil. "It appears reasonably safe, at least as a working hypothesis, to assume that the fat-soluble vitamine is a yellow plant pigment or a closely related compound."

Are Fats or Merely the Fat-soluble Vitamine Necessary in the Diet? Osborne and Mendel (23) have made use of their dried alfalfa with its very high fat-soluble vitamine and very low fat content to study the question of true fat requirement. They found that their young rats thrived on a diet of dried alfalfa, yeast, starch, meat residue, and salts, —that is, a diet almost free from true fats. "If true fats are essential for nutrition during growth, the minimum necessary must be very small."

Stability. The question of stability of the fat-soluble vitamine to heat has been further investigated, leaving still some uncertainty but

with increase of evidence showing non-destruction. Steenbock, Boutwell, and Kent (8) and Drummond (9) a year or more ago published their conclusions that the fat-soluble vitamine in butter fat is readily destroyed by heating at 100° for 1 to 4 hours, and partially destroyed at even lower temperatures. Drummond, interested particularly in the use of hydrogenated fats as butter and lard substitutes during the fat shortage in England, observed that the hydrogenation of the whale oil at 250° for 4 hours completely destroyed *A*. Even heating at 100° for an hour had the same effect, or keeping it for 18 days at 37° spread out exposed to air.

Osborne and Mendel (14), however, have since repeated their own earlier experiments, passing live steam for two and a half hours or longer into butter fat, and have also treated dry butter fat in an air bath at 96° for 15 hours, and in neither case did they observe a diminution of the fat-soluble vitamine. They raise "a question as to the value of the untreated butter fat or the food intake of the animals used by" Drummond. In other experiments (1) butter heated to 120° *without* aeration was satisfactory, but when air was passed through during the heating, destruction of *A* seemed complete. Light, too, is apparently an important cause of destruction of *A*, maybe the most important cause (21).

In plant tissue the vitamine seems to be very stable, either to heating or to drying (24) (14).

Relation to Diet of Cow. The amount of the fat-soluble vitamine in milk or butter is closely dependent upon the diet of the cow, being richer in spring milk when the cows are put out to pasture, and poorer in winter milk when they are on dry feed (25). This fact and related ones in regard to the other vitamines may explain many of the apparent discrepancies in the results of different investigators.

The fat-soluble vitamine therefore seems to be of even greater importance in the diet of young and old than was formerly realized. It is more widely distributed than at first thought—many vegetables, notably those with yellow coloring matter, being very significant sources of it, as well as butter and some other fats. Its stability to heat is still somewhat uncertain, but exposure to light is possibly the most important factor in its destruction.

WATER-SOLUBLE B

Methods of Study. For studying the water-soluble vitamine, observations have been continued on the growth of rats and on the onset of polyneuritis in pigeons and chickens. While it is not definitely proved that these two methods deal with one and the same substance, the assumption that such is the case is usually made. During the past year, however, evidence has increased that two distinct substances may be involved, for a sample of unmilled rice heated to 120° for 6 hours had ceased to be satisfactory for preventing polyneuritis in pigeons but was still satisfactory as the only source of the water-soluble vitamine for growing rats (26).

A new and most promising method of research was developed last year by Williams (27) in the laboratory of Physiological Chemistry of the University of Chicago. Yeast, he believes, unlike the higher plants, cannot grow without this vitamine. Therefore if drops of different solutions, each containing a single yeast cell, are observed microscopically at intervals of a few hours, the growth of the yeast and the number of cells into which it has multiplied will show, not only whether the solutions contain the vitamine, but the relative quantities present. This method is of course much simpler and quicker than the usual feeding experiment.

The method since its introduction has been modified in various ways (28) (29), but also it has been seriously criticized, especially from McCollum's laboratory (30). Not only vitamine extracts but various pure chemicals such as glucose and amino acids stimulate yeast growth. The method, the investigators conclude, is therefore "complicated by so many disturbing factors as to make it of little if any value." Williams and the others who have worked with the method have not yet had opportunity to reply to this criticism.

Occurrence. Water-soluble *B* occurs less in animal than in plant foods. Milk is by no means so rich in it as was formerly thought. Osborne and Mendel (31) found it necessary to give their rats at least 16 cc. per day for normal growth. They discuss but do not explain to their satisfaction the much-quoted results of Hopkins who secured remarkable growth on adding as little as 2 cc. of milk to a diet on which his rats were failing. They warn against a diet of white bread and only a little milk, or against feeding infants a top milk, water, sugar mixture. Pasteurization does not lower the quantity of the water-soluble vitamine

in milk (32), and condensed and evaporated milk also furnish a satisfactory source. The deficiency sometimes observed in slowly or highly heated milk is apparently due to the precipitation of part of the calcium, rather than the destruction of this vitamine (33). Unlike the case with the two other vitamines, the summer and winter differences in the diet of the cow are not of influence (32).

Muscle tissue also is low in this vitamine, but various other animal tissues—heart, kidney, brain, and liver—are satisfactory sources of supply, a distribution similar to that of *A* (11) though somewhat wider.

An especially satisfactory statement of the occurrence of this vitamine in plants, as so far known, is given by Osborne and Mendel (34) in the *Journal of Biological Chemistry* for August, 1919. They list a wide variety of plant foods, including among others seeds of cereals and a number of legumes, spinach, cabbage, potatoes, and carrots; and they add to the list, from their own recent experiments, the usual edible portion of the onion, turnip, beet (leaves, stem, and root), and tomato. Potato peel is no better than potato. Immature alfalfa, clover, and timothy show decided advantages over the mature. This variation with age may apply to plant foods in general and may mean a real nutritive superiority for young vegetables.

Fruits, too, are rich in *B* (35). Orange, lemon, and grape fruit juices as the sole source promote growth at about the same rate as an equal volume of milk, and dried orange juice is as satisfactory as fresh. The inner peel of orange also contains it. Apples, pears, and bottled grape juice[3] are not so rich as the citrus fruits. Nuts have an abundant supply (36). A goodly number of our common vegetables and fruits have thus been tested for *B* and so far without exception everyone has been found to contain it—a much wider distribution than that of *A*.

The part of the cereal that is rich in it is not the bran, as usually supposed, so much as the germ, which is often removed with the bran, e.g., in rice polishings. Commercial wheat bran contains more or less vitamine, according to the amount of the germ associated with it. Of one sample tested by Chick and Hume (37) five and a half times as much had to be used to cure polyneuritic pigeons as was necessary when the germ was used. Our commercial bran is especially thoroughly "skinned" when it comes from large well-equipped modern flour mills (38), and therefore is of little value to correct the deficiency of white flour

[3] Welch's grape juice.

and bread. Even the yeast or the milk used in the white bread does not prevent polyneuritis in pigeons (39), though the yeast delays the period of its onset. On the other hand, bread made from real graham flour is adequate. Of course these facts have important bearing upon the kind of flour most desirable from the standpoint of national nutrition. Voegtlin and Myers in a later paper (40) say, "We believe that a product which does not contain any bran but does include the germ would not possess these objectionable features [of causing intestinal disturbances], would, at the same time be more nutritious, and would reduce greatly the possibility of vitamine deficiency in the modern mixed diet."

Yeast (41) is distinctly the richest known source of the water-soluble vitamine, being four times as efficient as dried spinach which ranks next among a group studied quantitatively. Only half as rich as spinach are whole wheat, soy beans, dried eggs, milk solids. Cabbage, too, is not so satisfactory as spinach. Abderhalden (42) has succeeded in protecting pigeons, fed on polished rice, against polyneuritis by such minute daily amounts of yeast as 0.05–0.01 gram.

Stability. Water-soluble *B* is probably not so stable toward heat as we formerly supposed. McCollum's beans and peas (16), which, although heated for one and a quarter hours in an autoclave, still supplied all the *B* that the rat needed, were fed in large quantities, often as much as 25 per cent of the diet. When the food supplying *B* is fed in the smallest amount which will produce growth at all (43), it is found that heating above 100° does cause deterioration, and that the heated food has to be supplied in larger quantities than the raw food. For example, while wheat germ (44) heated 2 hours at 100° loses little or none of its potency, heated 40 minutes at 113° it loses one-half, and heated 2 hours at 118°–124° it may lose up to nine-tenths. These temperatures, of course, point to the safety of the water-soluble vitamine in our ordinary cooking processes, but the danger of its partial or complete destruction in commercial canning or other high pressure cooking. Both Miller (45) and Whipple (46) found that in ordinary cooking of carrots, beans, and cabbage, there was no destruction of *B* (yeast method) nor in cooking carrots at 115° for 45 minutes. Heating navy beans at 120° for 30 minutes, however, decreased their vitamine 40.6 per cent (Miller). A large part of the vitamine in ordinary cooking was found in the cooking water.

Tinned meat, Chick and Hume report, is devoid of this vitamine, a fact shown not only by their laboratory experiments, but by the repeated development of beri-beri in the British army in the Dardanelles and Mesopotamia where the diet for a time consisted only of white bread, tinned meat, and jam. The Indian soldier, on the other hand, remained immune from the beri-beri because his diet consisted chiefly of "atta," a coarsely ground wheat flour containing the germ and the aleurone layer of the grain, and also included 4 ounces daily of small lentils either whole or split (1).

The stability of *B* toward alkali seems to be uncertain, though here, too, according to Chick and Hume, the difficulties may be due to feeding such large quantities that a destruction of half or even more during the alkali treatment would not have noticeable effect on the animals. Sullivan and Voegtlin (47) of the United States Public Health Service, who observed several years ago that chickens developed polyneuritis promptly on corn bread made with soda but not on corn bread made with salt, now report polyneuritis in cats and dogs fed meat treated with sodium carbonate till distinctly alkaline and then heated at 120° for three hours; meat heated without the alkali was still a fairly satisfactory food. Rats, however, that were fed the alkali meat lived for at least 110 days—a fact quoted by Osborne and Wakeman (48) to show, with experiments of their own, that the vitamine is more resistant to alkali than generally supposed. Daniels and McClurg (49) feeding generous quantities of navy beans, soy beans, and cabbage, found the diets entirely satisfactory even when cooked for an hour and a half with 5 per cent sodium bicarbonate. McCollum and Simmonds (50) find the *B* in wheat germ destroyed by boiling with 0.28 per cent sodium hydroxide for an hour, but Osborne and Wakeman (48) find it undiminished in yeast digested with tenth normal sodium hydroxide (slightly stronger than McCollum's) for twenty-two and a half hours, and then heated for two hours. It may be that previous extraction with ether or other removal of the fat lessens the stability of *B* (26).

Water-soluble B and Appetite. Very strikingly, a relation seems to exist between the presence of the water-soluble vitamine in the diet and the amount of food eaten. Karr (51) (52), in Mendel's laboratory, gave dogs a liberal ration, satisfactory in every respect except its lack of *B*. He found that their food consumption, normally large the first day, gradually fell off, sometimes till they refused to eat at all. Then he added the vitamine, separate from the food so that it could not have

affected the palatability, and their food intake began to go up at once. The "appetite-provoking substance" was found in brewery yeast, baker's yeast, canned tomatoes, and milk. From 0.5–1.5 gm. brewery yeast daily were required to bring the appetite back to normal, about 3 gm. baker's yeast, 50 cc. to 150 cc. milk, or 100 cc. to 200 cc. tomato.

Certain animals which, unlike most, continued to eat their food for a longer time without the vitamine developed characteristic polyneuritic symptoms.

Contrary to some of the conclusions with McCarrison's pigeons and monkeys discussed below, Karr's dogs showed no diminished coefficient of digestibility for the protein they did eat without the vitamine, nor any notable irregularity in the intermediary protein metabolism. As also with Lumière's pigeons (53) the question seems to be purely one of appetite. It "thus remains among the secrets which the physiology of nutrition has still to reveal."

Some Results of Lack of B. What happens in the body as a result of lack of the water-soluble *B* in the diet? McCarrison (54), working in India[4] has made striking advances in answering this question. He has observed changes during life and loss in weight of organs after death in a large group of pigeons made polyneuritic by a diet of polished rice and later a group fed polished rice, butter fat to supply *A*, and onions for *C*.[5] There was little difference between the group undergoing *B* starvation and that with general vitamine starvation. The body temperature of the pigeons gradually fell from a normal average of 107°F. to 98° or 99°F., showing a marked slowing up of metabolic processes. Digestive processes were greatly impaired; the starch was largely excreted unchanged. The different organs of the body lost weight strikingly (all except the adrenals which gained); thymus most, then, in order, testicles, spleen, ovary, pancreas, heart, liver, kidneys, stomach, thyroid, brain. The testicles lost 93 per cent and the ovaries 69 per cent of the original weight. "Perhaps one of the most remarkable results of a dietary deficient in so-called anti-neuritic vitamine is the constant and very pronounced atrophy of the testicles in males

[4] A fairly full abstract of the first of these papers is given in *British Medical Journal* 1, 177, (Feb.), 1919, and a briefer reference to it by Le Mer in *Jour. Amer. Med. Assoc.* 73, 1381, (Nov. 1), 1919.

[5] Observe apparent contradiction here with Osborne and Mendel's work with rats, proving *B* in onions. McCarrison's pigeons became polyneuritic even more promptly in the butter-fat-onion group than on polished rice alone.

and the similar but less pronounced atrophy of the ovary in females." Other investigators have noted similar results of vitamine starvation. Drummond found that when male rats after as short a time as 14 days on a diet adequate except for *B* were mated with females on an adequate diet no pregnancies resulted.

Such degrees of atrophy in the human subject would result in sterility in males and in amenorrhoea and sterility in females. Human observations are not lacking. McCarrison quotes Vedder as saying that beri-beri women cease to menstruate. "War amenorrhoea" (abnormal cessation of menstruation) is referred to in many recent German periodicals with alarm, attributing it in part at least to defective nutrition. In the Charité-Frauenklinik in Berlin it has been seven times more frequent than before the war.[6] In Belgium, too, many cases have been observed (55). The experience of Benedict's young men is also striking (56). These difficulties may, of course, be due to general food lack rather than to the specific deficiency in *B*.

Miscellaneous infections were very frequent among McCarrison's pigeons. The whole body was liable to be overcome by a rank growth of bacteria. There may be some similarity between this observation and the great increase in tuberculosis abroad during the war.

McCarrison's more recent work has included experiments with monkeys and with guinea pigs, as well as with many more pigeons, and with a variety of deficient diets. The results with the monkeys conform in a general way to those with the pigeons, except that the reproductive organs especially, and a few other parts, are less affected in the monkeys by lack of the antineuritic vitamine. He observes particularly the many changes in the gastro-intestinal tract of his monkeys. The mucous membrane became inflamed for its entire length, the muscular control was impaired so that the stomach was dilated and ballooning of areas of the small and large bowel took place, and the glands secreting the digestive juices were markedly affected. He also finds that a diet deficient in *B* but well balanced in its protein and carbohydrate constituents has a much less harmful effect than one containing low protein and excessive carbohydrate and fat. This may explain Karr's more satisfactory results with his dogs.

McCarrison's statement of some of the "chief clinical evidences of disease" observed in his monkeys on diets without the anti-neuritic

[6] *Brit. Med. Jour.*, Dec. 1, 1917, p. 734.

vitamine may well be partially quoted: progressive anemia, asthenia, loss of appetite, diarrhea, dysentery, headache, sub-normal temperature, enfeebled heart action. Nervous symptoms appeared later. "It is thought that the findings recorded in this paper may afford some explanation of the genesis of that great mass of ill-defined gastro-intestinal disorder and vague ill-health which forms so high a proportion of human ailments at the present day."

Infant Nutrition and Water-soluble B. From the point of view of immediate application to human welfare in this country, possibly the most satisfying experiments with the water-soluble vitamine are those which show its very favorable influence on the growth of malnourished infants. Byfield and Daniels (57), in the Iowa Child Welfare Research Station, report their work with 7 such infants who were not growing on the usual satisfactory hospital dose of orange juice—15 cc. daily. They increased the quantity to 45 cc. and all the babies began to gain. The gain ceased when only 15 cc. was given for about 10 days, and started up again when the larger quantity was restored. It was the antineuritic vitamine in the extra orange juice that was effective, not the antiscorbutic (see below), for some orange juice, shaken with kaolin which removes the antineuritic but not the antiscorbutic vitamine, and then filtered, did not cause the growth in the babies. Also in previous work the authors had obtained good growth in babies given wheat embryo extract.

Eddy (58) also, somewhat earlier, in New York, has reported similar results on feeding extra water-soluble *B*, in part prepared from the navy bean. One of his infants gained 0.84 ounce per day for 32 days with the added vitamine, as compared with 0.47 ounce per day during the 17 days preceding. There was already much more vitamine in the food than in the added extract. The author suggested that "this result may be due to the fact that the child could utilize the extracted vitamine when it could not utilize the vitamine in the diet."

WATER-SOLUBLE C

The third vitamine now recognized is the antiscorbutic. The earlier conclusion (59) that scurvy is not a deficiency disease, but is due to constipation, has been abandoned. Its adoption probably arose from having a non-controlled milk intake in the diet of the experimental animals and therefore a slight and variable amount of the vitamine.

Effect of Lack of C in the Diet. With this vitamine even more than with the others, human experience as well as laboratory experiments must be considered—both infantile scurvy and adult scurvy. Mild cases of the latter may merely manifest themselves in languor and depression, and severe cases in looseness and final falling out of the teeth, soreness and hemorrhages of the gums, swelling of the joints, great weakness, and finally death. Degenerative tooth changes are particularly characteristic of scurvy (60). They have been described at length in the guinea pig and are said to be identical in the human subject. Sometimes the guinea-pig conditions, when on a diet very low in green foods, closely simulate pyorrhea in human beings and at least the beginning of dental caries (61) (62).

Methods of Study. The laboratory animal most used is the guinea pig, and to a lesser extent the monkey, for rats, while according to some investigators they thrive better with the antiscorbutic than without it (63), do not have scurvy. The usual experimental method, carefully worked out, is to note the smallest quantity of experimental food which will prevent the onset of scurvy in the guinea pig when added to a basal "scorbutic diet" such as oats, hay, and autoclaved milk.

Among the chief workers on the antiscorbutic vitamine are Hess in New York, whose book, Scurvy Past and Present, forms a very valuable addition to the literature of scurvy in 1920 (64); Givens in New Haven and Rochester; and the group, largely women, at the Lister Institute of Preventive Medicine, London—Harriette Chick, E. Margaret Hume, and others. Chick and Dalyell spent 9 months in Vienna in 1919–20, observing and working among the many children ill with diseases resulting from inadequate diet. A partial report of their experience was given in the Discussion on the Present Position of Vitamines in Clinical Medicine, at last summer's meeting of the British Medical Association (1). Earlier, the Lister Institute work was made the basis of the recommendations of the Food (War) Committee of the Royal Society on the prevention of scurvy in the army and navy (65). Three editorials (66) in the *Journal of the American Medical Association* summarize much of their work as well as that of others.

Vegetables and Fruit as Sources of C. "The vitamine is present in living vegetable and animal tissues, in largest amounts in fresh fruits and green vegetables, to a less extent in root vegetables and tubers. It is present in small amount in fresh meat and milk, and has not been detected in yeast, fats, cereals, pulses" (67). It is sensitive to

high temperature and may be destroyed "when the living tissue is disorganized."

Orange juice has been generally recognized as one of the best antiscorbutics; grapes are only about one tenth as satisfactory. Orange peel extract is also of value. Lime juice is poor. The "lime juice" of the eighteenth and early nineteenth century which was responsible for the disappearance of scurvy from the British navy was really lemon juice from the Mediterranean countries. In 1875 certain vessels on polar exploration changed from the old "lime juice" to the true west Indian lime, and scurvy broke out again with great severity. The Lister Institute work has shown that fresh lemon juice has about four times the value of fresh lime juice as an antiscorbutic and that preserved lime juice is almost valueless.

Of the vegetables (68), often more readily available than the fruit and cheaper, raw cabbage is even better than orange juice, and the raw juices of swede (a kind of turnip), beetroot, and carrots are of service, as is also raw or cooked rhubarb (69). Dalyell (1) shows charts with marked improvement in weight on giving a 6 months old, artificially fed child, in Vienna, 10 grams raw turnip juice and 10 grams butter; and, in another case, on adding raw turnip juice and butter to the nursing mother's diet. Cooking (87), however, in most cases diminishes or entirely destroys the efficiency of the vegetables except when they (carrots) are young (Hess). Cabbage (70) cooked for one hour at 60° or twenty minutes at 90° to 100° lost about 70 per cent of its antiscorbutic value, and for one hour at 90° more than 90 per cent. On repeating part of this work 2 years later (71) similar results were obtained with cabbage, and swede juice was found to be somewhat more stable. Long cooked or canned vegetables are thus of no value as antiscorbutics, a fact borne out by human experience for many years. Canned tomatoes (87) are an exception, possibly because of their acid and original richness in the substance. They have been successfully used as a substitute for the more expensive orange juice to prevent scurvy in infants receiving pasteurized milk. Hess (64) considers canned tomato the most serviceable antiscorbutic for artificially fed infants, regarding it as "a palatable solution of the 3 vitamines." He recommends feeding it at the rate of about 30 g. per day.

Potatoes contain a fair amount of the vitamine if not cooked too long (72). For instance, guinea pigs on 10 grams raw potatoes or the same quantity cooked at 100° for 15 minutes were free from scurvy,

but on potatoes cooked for 1 hour they developed it. As the only antiscorbutic for human beings the ration must be as much as fourteen ounces per man per day (65). In Glasgow (73), recently, a poor law hospital which had apparently been depending largely on potatoes and had been near the danger line with a normal of three cases of scurvy a year, developed fifty cases when the lack of potatoes in the fall and winter of 1916–17 caused the substitution of the potatoes by rice and bread. In this country, too, Hess (74) speaks of the development of scurvy in numerous institutions in the spring of 1916 after an exceptionally poor potato crop the previous year. In one there were more than twenty deaths, in another more than two hundred diagnosed cases and probably many latent cases which escaped observation.

Drying, too, may lessen the value of an antiscorbutic food (75). Dried vegetables and herbs have been tried in cases of scurvy in the army and navy with no help. Dried tomatoes, however, Givens (76) found, still retain a significant amount of the original high antiscorbutic potency. So do dried orange and lemon juice (77) (78). Commercial products are already being prepared from these fruits. Drying generally does least harm when done *quickly* at a low temperature (under diminished pressure) and when the vegetables dried are young. Quick drying at a higher temperature, however, is much better than prolonged heating at a lower temperature. It may be, as suggested by Givens and McCluggage (72), that enzyme action as well as heat is involved in the destruction of the antiscorbutic, and this of course could take place at the maximum rate at 35–40° where some of the prolonged experimental drying has been carried on. Dried potatoes are more satisfactory as an antiscorbutic if they are baked before drying—a further indication for the enzyme idea.

Dried beans, themselves valueless, develop their vitamine on sprouting (79). The Food (War) Committee of the Royal Society recommends (65) that when other antiscorbutics are not available the beans be sprouted and the sprouts used. Their therapeutic value was strikingly shown when King's College Hospital, London, with a number of mild cases of scurvy in soldiers from Serbia, divided its patients into two groups, treating thirty in one ward with 4 ounces of fresh lemon juice daily and twenty-seven in another with 4 ounces of dried haricot beans freshly germinated. Of the patients on the lemon juice 53.4 per cent were cured within four weeks and of those on the germinated beans 70.4 per cent (80).

No more striking and terrible illustration of the lack of fresh vegetables could be expected than the experience of the Indian troops in Mesopotamia during the war (1). The supplying of fresh vegetables and fruits seemed to be impossible during a long period. As a consequence, from July 1 to December 31, 1916, 11,000 cases of scurvy occurred. British troops did not have it because they had their fresh meat which the Indian troops would not eat, and because they had arrived in the country in good condition and the Indians often on the borderland of scurvy. The measures used to meet the outbreak constituted "a remarkable innovation in the hygiene of armies" (Hess (64), p. 19), for the British government sent over a body of 256 men as "Gardener's Corps" to plant gardens and supply seeds.

Occurrence of C in Animal Foods. Milk (81) is only of moderate value as an antiscorbutic and even its moderate value varies considerably with the diet of the cow (82, 83, 84). Twenty cc. of "summer" milk when the cow is in pasture, may be better than 60 cc. "winter" milk with the cow on dry fodder. In general milk loses most of the value as an antiscorbutic when pasteurized or boiled (85), though not when quickly "scalded." Numerous observations have been made of infantile scurvy developing from use of pasteurized milk and its check by the addition of orange juice. Commercial condensed milk (86) is valueless and so, too, is dried milk unless the drying is done very quickly, e.g., for a few seconds at 116° (87). Properly prepared dried milk may actually cure infantile scurvy (Hess (64), p. 46). In this connection should be mentioned a very valuable summary—Morse's "A Résumé of the Literature of Infantile Scurvy during the Past Two Years," in the *Boston Medical and Surgical Journal* (88). An editorial in the *Journal of the American Medical Association* (89) cites numerous recent distressing cases of infantile scurvy abroad; for instance, in Prague in 1917–18 when the much desired "raw" milk was often of doubtful "rawness," oranges had disappeared from the markets since early in the war, and other fruits and even most green vegetables were difficult to obtain and usually very expensive.

Fresh meat has so little antiscorbutic value that the Royal Society (65) states that as much as two to four pounds daily are necessary if it is to be used as the chief preventive agent, and tinned meat is completely valueless. Dutcher, Pierson, and Biester (90) find practically none even in raw beef. Their laboratory experiments do not confirm Stefánsson's remarkable report (91) of his polar experiences. His habit, and that

of his party in the north, was to live almost wholly on seal meat and bear meat, using not only the muscle tissue, but liver and various other organs. Often they consumed raw frozen liver. They had no cases of scurvy on this diet. However, three men, who were separated at times from the main party and depended largely on some cached foods which they had found—flour, salt pork, butter, honey, sugar, pilot bread, preserved fruit, pemmican, meat extract, dried fruit, rice, beans, and peas—developed serious scurvy. They were promptly cured when fed meat, largely raw.

It is rather surprising that rats' livers contain the antiscorbutic vitamine, even when their diet is free from it (92). Apparently the rats, unlike most animals investigated, can synthesize the vitamine themselves and must use it in their own metabolism. Their powers of synthesis must have furnished the only source of supply to the Arctic explorer Smith who attributed his freedom from scurvy to eating the ship's rats which were of necessity on a diet very low in *C*.

One more human scurvy experience (93) illustrates a number of the points so far stated. A number of camps of the South African Native Labour Corps were established in France during the war. The rations consisted of 1 pound frozen or preserved meat, 8 ounces fresh vegetables, and definite quantities of mealy meal (corn) or rice, bread, coffee, sugar, salt, margarine, and tobacco. In country depots where they could pick extra fruit (apples) no scurvy occurred, but in a camp when this was impossible 40 per cent of the natives at one time showed symptoms of scurvy. The half pound of fresh vegetables probably allowed no margin for the reduction of the antiscorbutic, and yet all foods had been cooked for at least three hours. The chief part of the cure was to give lemon juice, increase the supply of vegetables, and limit their cooking to forty-five minutes. In a camp where the scurvy was most severe and lasted longest it was discovered that the instruction to shorten the cooking period had been disobeyed. The condition was soon improved when the cooking was reduced to forty minutes.

CONCLUSION

In conclusion, it is plain that remarkable as are the advances in the subject, we still have far to go for anything approaching complete knowledge. We need more *quantitative* information as to the distribution of the vitamines in foods and their resistance to all sorts of manip-

ulations—cooking, storing, aging. We lack knowledge of the quantities advisable for human beings of different ages. Finally, and most fundamentally, we yet await the isolation of the substances themselves in purity and the establishment of their chemical composition.

It is very difficult to say what is the importance to the average individual of giving thought to these three vitamines in choosing the diet. Most of us probably use milk or leaf vegetables (McCollum's "protective foods") to get an adequate supply of *A*, enough vegetables of all kinds and whole cereals to get *B*, and enough uncooked or little cooked foods for *C*. But the occasional moderately well-to-do individual with dietary idiosyncracies, many persons on very limited incomes, and many in institutions must be close to the danger line. Probably *C* with its marked unstability to heating or drying is the most often low in quantity, and *A* with its limited distribution second. It is more than probable, too, that all sorts of common languors and inefficiencies and susceptibilities to many miscellaneous infections are connected with shortage in vitamines.

BIBLIOGRAPHY

1. Hopkins, F. G., Chick, H., Dalyell, E. J., et al.: Discussion on the present position of vitamines in clinical medicine. *Brit. Med. Jour.*, 1920, ii, 147.
2. Drummond, J. C.: Researches on the fat-soluble accessory substance. II. Observation on its rôle in nutrition and influence on fat metabolism. *Biochem. Jour.*, 13, 95, 1919.
3. Hopkins, F. G., and Chick, H.: *Lancet*, 2, 28, 1919.
4. McCollum, E. V., Simmonds, N., and Parsons, H. T.: The etiology of rickets. *Proc. Soc. Biol. Chem., Jour. Biol. Chem.*, 41, xxxi, (Mar.), 1920.
5. Mellanby, E.: Discussion on the importance of accessory food factors (vitamines) in the feeding of infants. *Proc. Royal Soc. Med.*, 13, Sec. for the Study of Disease in Children, 57, (May), 1920.
6. Hess, A. F., and Unger, L. J.: The clinical rôle of the fat-soluble vitamine: its relation to rickets. *Jour. Am. Med. Assoc.*, 74, 217, Jan. 24, 1920.
7. Hess, A. F., and Unger, L. J.: Prophylactic therapy for rickets in a negro community. *Jour. Amer. Med. Assoc.*, 69, 1583, 1917.
8. Steenbock, H., Boutwell, P. W., and Kent, H. E.: Fat-soluble vitamine. I. *Jour. Biol. Chem.*, 35, 517, 1918.
9. Drummond, J. C.: Researches on the fat-soluble accessory substance. I. Observations upon its nature and properties. *Biochem. Jour.*, 13, 81, 1919.
10. Halliburton, W. D., and Drummond, J. C.: The nutritive value of margarines and butter substitutes with reference to their content of fat-soluble accessory growth substance. *Jour. Physiol.*, 51, 235, 1917.
11. Osborne, T. B., and Mendel, L. B.: Nutritive factors in animal tissues. II. *Jour. Biol. Chem.*, 34, 17, 1918.
12. Daniels, A. L., and Loughlin, R.: The fat-soluble growth promoting substance in lard and cotton seed oil. *Jour. Biol. Chem.*, 42, 359, (July), 1920.

13. Drummond, J. C., and Coward, K. H.: Researches on the fat-soluble accessory substance. *V*. The nutritive value of animal and vegetable oils and fats considered in relation to their color. *Biochem. Jour.*, 14, 668, 1920.
14. Osborne, T. B., and Mendel, L. B.: Nutritive factors in plant tissues. IV. Fat-soluble vitamine. *Jour. Biol. Chem.*, 41, 549, (Apr.), 1920.
15. Steenbock, H., and Boutwell, P. W.: Fat-soluble vitamine. III. The comparative nutritive value of white and yellow maizes. *Jour. Biol. Chem.*, 41, 81, (Jan.), 1920.
16. Denton, M. C., and Kohman, E.: Feeding experiments with raw and boiled carrots. *Jour. Biol. Chem.*, 36, 249, 1918.
17. McCollum, E. V., Simmonds, N., and Parsons, H. T.: The dietary properties of the pea. *Jour. Biol. Chem.*, 37, 287, 1919.
18. Sugiura, K., and Benedict, S. R.: The nutritive value of the banana. *Jour. Biol. Chem.*, 36, 171, 1918.
19. Steenbock, H.: White corn vs. yellow corn and a probable relation between the fat-soluble vitamine and yellow plant pigments. *Science*, 50, 352, 1919.
20. Osborne, T. B., and Mendel, L. B.: The occurrence of water-soluble vitamine in some common fruits. *Jour. Biol. Chem.*, 42, 465, (July), 1920.
21. Steenbock, H., and Boutwell, P. W.: Fat-soluble vitamine. VI. The extractability of the fat-soluble vitamine from carrots, alfalfa, and yellow corn by fat solvents. *Jour. Biol. Chem.*, 42, 131, (May), 1920.
22. Rosenheim, O., and Drummond, J. C.: The relation of lipochrome pigments to the fat-soluble accessory food factor. *Lancet*, 1920, i, 862.
23. Osborne, T. B., and Mendel, L. B.: Growth on diets poor in true fats. *Jour. Biol. Chem.*, 45, 145, (Dec.), 1920.
24. Steenbock, H., and Gross, E. G.: Fat-soluble vitamine. IV. The fat-soluble vitamine content of green plant tissue together with some observations on their water-soluble vitamine content. *Jour. Biol. Chem.*, 41, 163, (Feb.), 1920.
25. Dutcher, R. A., Kennedy, C., and Eckles, C. H.: The influence of the diet of the cow upon the fat-soluble and water-soluble vitamine of cow's milk. *Science*, 52, 588, (Dec. 17), 1920.
26. Emmett, A. D., and Luros, G. O.: Water-soluble vitamines. I. Are the antineuritic and water-soluble B vitamines the same? *Jour. Biol. Chem.*, 43, 265, (Aug.), 1920.
27. Williams, R. J.: The vitamine requirement of yeast. *Jour. Biol. Chem.*, 38, 465, 1919.
28. Williams, R. J.: A quantitative method for determination of vitamine. *Jour. Biol. Chem.*, 42, 259, (June), 1920.
29. Funk, C., and Dubin, H. E.: A test for antiberi-beri vitamine and its practical application. *Jour. Biol. Chem.*, 44, 487, (Nov.), 1920.
30. Souza, G. de P., and McCollum, E. V.: A study of the factors which interfere with the use of yeast as a test organism for the antineuritic substance. *Jour. Biol. Chem.*, 44, 113, (Oct.), 1920.
31. Osborne, T. B., Mendel, L. B., Ferry, E. L., and Wakeman, A. L.: Milk as a source of water-soluble vitamine. *Jour. Biol. Chem.*, 34, 537, 1918.
32. Osborne, T. B., and Mendel, L. B.: Milk as a source of water-soluble vitamine. II. *Jour. Biol. Chem.*, 41, 515, (Apr.), 1920.
33. Daniels, A. L., and Loughlin, R.: A deficiency in heat-treated milks. *Jour. Biol. Chem.*, 44, 381, (Nov.), 1920.
34. Osborne, T. B., and Mendel, L. B.: Nutritive factors in plant tissue. *Jour. Biol. Chem.*, 39, 29, 1919.

35. Osborne, T. B., and Mendel, L. B.: The occurrence of water-soluble vitamine in some common fruits. *Jour. Biol. Chem.*, 42, 465, (July), 1920.
36. Cajori, F. A., Some nutritive properties of nuts: their proteins and content of water-soluble vitamine. *Jour. Biol. Chem.*, 43, 583, (Sept.), 1920.
37. Chick, H., and Hume, E. M.: The distribution in wheat, rice and maize grains of the substance, the deficiency of which in a diet causes polyneuritis in birds and beri-beri in man. *Proc. Roy. Soc.* 90B, 44, 1917.
38. Briggs, C. H.: The digestibility of the branny coats of wheat. *Science*, 50, 427, 1919.
39. Voegtlin, C., Lake, G. C., and Myers, C. N.: The dietary deficiency of cereal foods with reference to their content in "antineuritic vitamine." *U. S. Pub. Health Repts.*, 33, 647, 1918.
40. Voegtlin, C., and Myers, C. N.: Distribution of the antineuritic vitamine in wheat and corn kernel. *Amer. Jour. Physiol.*, 48, 504, 1919.
41. Osborne, T. B., and Mendel, L. B.: The vitamines in green foods. *Jour. Biol. Chem.*, 37, 187, 1919.
42. Abderhalden, E.: Weitere Beitrage zur Kenntnis von organischen Nahrungsstoffen mit spezifischen Wirkung. II. *Pfluger's Arch.*, 182, 133, 1920.
43. Chick, H., and Hume, E. M.: Note on the importance of accurate and quantitative measurements in experimental work on nutrition and accessory food factors. *Jour. Biol. Chem.*, 39, 203, 1919.
44. Chick, H., and Hume, E. M.: Effect of exposure of temperature at or above 100°C. upon the substance (vitamine) whose deficiency in a diet causes poylneuritis in birds and beri-beri in man. *Proc. Roy. Soc.*, 90B, 60, 1917.
45. Miller, E. W.: The effect of cooking on the water-soluble vitamine in carrots and navy beans. *Jour. Biol. Chem.*, 44, 159, (Oct.), 1920.
46. Whipple, B. K.: Water-soluble B in cabbage and onion. *Jour. Biol. Chem.*, 44, 175, (Oct.), 1920.
47. Sullivan, M. X., Voegtlin, C.: The distribution in foods of the so-called vitamines and their isolation. *Proc. Soc. Biol. Chem., Jour. Biol. Chem.*, 24, xvi, 1916.
48. Osborne, T. B., Wakeman, A. J., and Ferry, E. L.: Preparation of protein free from water-soluble vitamine. *Jour. Biol. Chem.*, 39, 35, 1919.
49. Daniels, A. L., and McClurg, N. I.: Influence of high temperatures and dilute alkalies on the antineuritic properties of foods. *Jour. Biol. Chem.*, 37, 201, 1919.
50. McCollum, E. V., and Simmonds, N.: A study of the dietary essential, water-soluble B, in relation to its solubility towards reagents. *Jour. Biol. Chem.*, 33, 55, 1918.
51. Karr, W. G.: Some effects of water-soluble vitamine upon nutrition. *Jour. Biol. Chem.*, 44, 255, (Nov.), 1920.
52. Karr, W. G.: Metabolism studies with diets deficient in water-soluble (B) vitamine. *Jour. Biol. Chem.*, 44, 277, (Nov.), 1920.
53. Lumière, A.: Starvation of pigeons fed with hulled rice. *Bull. Acad. Med., Paris*, 83, 310, 1920.
54. McCarrison, R.: The pathogenesis of deficiency disease. *Indian Jour. Med. Research*, 6, 275, 1919: ibid., 6, 550, 1919; ibid., 7, 167, 1919; ibid., 7, 188, 1919; ibid., 7, 269, 1919; ibid., 7, 279, 1919; ibid., 7, 308, 1919; ibid., 7, 342, 1919; ibid., 7, 633, (Jan.), 1920.
55. Belgian Letter: *Jour. Amer. Med. Assoc.*, 73, 1228, 1919.
56. Miles, W. R.: The sex expression of men living on a lowered nutritional level. *Jour. Nervous and Mental Diseases*, 49, 208, 1919.
57. Byfield, A. H., and Daniels, A. L.: The antineuritic and growth stimulating properties of orange juice. *Amer. Jour. Dis. Child.*, 19, 349, (May), 1920.

58. EDDY, W. H.: Further studies on the use of water-soluble B in the treatment of infant malnutrition. *Proc. Soc. Biol. Chem., Jour. Biol. Chem.*, 41, xxxiv, (Mar.), 1920.
59. MCCOLLUM, E. V., AND PITZ, W.: The "vitamine" hypothesis and deficiency diseases. *Jour. Biol. Chem.*, 31, 229, 1917.
60. ZILVA, S. S., AND WELLS, F. M.: Changes in the teeth of the guinea-pig on a scorbutic diet. *Proc. Roy. Soc.*, 90B, 505, 1919.
61. HOWE, P. R., Effect of scorbutic diets upon the teeth. *Dental Cosmos*, 62, 586, 1920.
62. HOWE, P. R.: Food accessory factors in relation to the teeth. *Jour. Home Econ.*, 12, 482, (Nov.), 1920.
63. HARDEN, A., AND ZILVA, S. S.: Accessory factors in nutrition of the rat. *Biochem. Jour.*, 12, 408, 1918.
64. HESS, A. F.: Scurvy past and present (book), pages vii + 279, J. B. Lippincott Co. 1920.
65. Memorandum on food and scurvy by the food (war) committee of the Royal Society, *Lancet*, London, 756, 1919.
66. Editorial, Antiscorbutics. I. *Jour. Amer. Med. Assoc.*, 73, 271, 1919; Antiscorbutics. II. Ibid., 73, 338, 1919; Scurvy in animals. Ibid., 73, 1288, 1919.
67. CHICK, H., HUME, E. V., SKELTON, R. F., AND SMITH, A.: The relative content of anti-scorbutic principle in limes and lemons. *Lancet*, London, 735, 1918.
68. CHICK, H., AND RHODES, M.: An investigation of the antiscorbutic value of the raw juices of root vegetables. *Lancet*, London, 774, 1918.
69. PIERSON, E. M., AND DUTCHER, R. A.: Rhubarb as an antiscorbutic. *Science*, 51, 70, 1920.
70. DELF, E. M.: The antiscorbutic value of cabbage. I. *Biochem. Jour.*, 12, 416, 1918.
71. DELF, E. M.: The effect of heat on the antiscorbutic accessory factor of vegetables and fruit juices. *Biochem. Jour.*, 14, 21, (Apr.), 1920.
72. GIVENS, M. H., AND MCCLUGGAGE, H. B.: Antiscorbutic property of vegetables. II. An experimental study of raw and dried potatoes. *Jour. Biol. Chem.*, 42, 491, (July), 1920.
73. Editorial, Recent cases of scurvy in Glasgow. *Brit. Med. Jour.*, 2, 28, 1917.
74. HESS, A. F.: Rôle of antiscorbutics in our dietary. *Jour. Amer. Med. Assoc.*, 71, 941, 1918.
75. DELF, E. M., AND SKELTON, R. F.: Antiscorbutic value of cabbage. II. *Biochem. Jour.*, 12, 448, 1918.
76. GIVENS, M. H., AND MCCLUGGAGE, H. B.: Influence of temperature on the antiscorbutic vitamine in tomatoes. *Proc. Soc. Biol. Chem., Jour. Biol. Chem.*, 41, xxiv, (Mar.), 1920.
77. HARDEN, A., AND ROBISON, R.: Antiscorbutic properties of concentrated fruit juice. III. *Biochem. Jour.*, 14, 171, (Apr.), 1920.
78. BASSETT-SMITH, P. W.: Preservation of lemon juice. *Lancet*, 1920, 2, 997.
79. CHICK, H., AND DELF, E. M.: The antiscorbutic value of dry and germinated seeds. *Biochem. Jour.*, 13, 199, 1919.
80. Wiltshire, H. W.: Value of germinated beans in the treatment of scurvy. *Lancet*, London, 2, 811, 1918.
81. CHICK, H., HUME, E. M., AND SKELTON, R. F.: An estimate of the antiscorbutic value of milk in infant feeding. *Lancet*, London, 1, 1918.
82. DUTCHER, R. A., ECKELS, C. H., DAHLE, C. D., MEAD, S. W., AND SCHAEFER, O. G. Vitamine studies. VI. The influence of diet of the cow upon the nutrition and antiscorbutic properties of cow's milk. *Jour. Biol. Chem.*, 45, 119 (Dec.), 1920.
83. HART, E. B., STEENBOCK, H., AND ELLIS, N. R.: Influence of diet on the antiscorbutic potency of milk, *Jour. Biol. Chem.*, 42, 383 (July), 1920.

84. Hess, A. F., Unger, L. J., and Supplee, G. C.: Relation of fodder to the antiscorbutic potency and salt content of milk. *Jour. Biol. Chem.*, 45, 229, (Dec.), 1920.
85. Barnes, R. E., and Hume, E. M.: Relative antiscorbutic value of fresh, dried, and heated cow's milk. *Biochem. Jour.*, 13, 306, 1919.
86. Hart, E. B., Steenbock, H., and Smith, D. W.: Studies of experimental scurvy. *Jour. Biol. Chem.*, 38, 305, 1919.
87. Hess, A. F., and Unger, L. J.: The scurvy of guinea pigs. III. The effect of age, heat and reaction on antiscorbutic foods. *Jour. Biol. Chem.*, 38, 293, 1919.
88. Morse, J. L.: A résumé of the literature of infantile scurvy during the past 2 years. *Boston Med. Surg. Jour.*, 182, 428, 1920.
89. Editorial, Child welfare and disease under war-time food conditions in Central Europe. *Jour. Amer. Med. Assoc.*, 72, 939, 1919.
90. Dutcher, R. A., Pierson, E. M., and Biester, A.: Vitamine studies. V. The antiscorbutic properties of raw beef. *Jour. Biol. Chem.*, 42, 301, (June), 1920.
91. Stefànsson, V.: Observations on three cases of scurvy. *Jour. Amer. Med. Assoc.*, 71, 1715, 1918.
92. Parsons, H. T.: The antiscorbutic content of certain body tissues of the rat. *Jour. Biol. Chem.*, 44, 587, (Nov.), 1920.
93. Dyke, H. W.: Outbreak of scurvy in the South African Native Labour Corps. *Lancet*, London, 2, 513, 1918.

CONFERENCE OF CLOTHING SPECIALISTS

Significant in the development of extension work in the northern and western states was the meeting of clothing specialists and state leaders from twenty-six states held at Ames, Iowa, November 8 to 14. Florence E. Ward, in charge of extension work in the North and West, presided.

Clothing work as a phase of home economics extension teaching has come so rapidly into prominence within the last two or three years that at present the service claims twenty-three specialists in the northern and western states. While the standards and ultimate aims of clothing instruction may be the same in extension teaching as in resident teaching at state colleges, the methods and immediate aims in dealing with homemakers offer many new problems that call for study and analysis.

Among the high lights in the discussions were the following subjects: the value of surveys in making programs, the extent to which local leaders can effectively carry on the work, the part that records play in a clothing project, possibilities of promoting health through clothing work, the need of drill in efficient methods in garment construction, the relative importance of hat making in a clothing program, effective illustrative

material, county and state fairs as a means of promoting the work, the relationship of specialists to state and federal work, and the possibility of simplifying and strengthening monthly and annual reports.

A demonstration of a so-called style show in the form of a play was given by Ames students under the direction of the extension instructor in design to point out the possibilities of this sort of appeal for suitability and beauty in the high school girl's dress.

Of equal interest with the discussions of technical subject matter was the glimpse of the sociological value of the work revealed through the stories from far corners of the country. Adaptability to conditions is one of the prime requisites of a successful extension teacher; in fact, it would seem that there is small opportunity for her to get into the proverbial rut. As compensation for the many quick shifts in plan that must be made and the difficulties of itinerant work, there is the variety of scene, situation, people, and problems which always refreshes one's interest and gives color to the day's activity. The privilege of knowing many kinds of people and homes is offered liberally to extension workers.

As the discussion of local leaders progressed, it became apparent that the group was considering, not only a means of extending information on clothing, but also the development of leadership that would be a permanent asset to the community and to the individual.

High standards for extension work in clothing seem to be jealously guarded and, when pressure of work or a necessary decision in favor of a more important matter has caused relaxation in standards of teaching as has necessarily been the case sometimes in the pioneer stage of development, it seems always to have been with regret and with the happy conviction that the work is now reaching such a stage of development that attention can be given to perfecting methods.

The machinery offered by the farm or home bureau organization for carrying on this form of teaching is a boon to the extension instructor. Its many advantages are fully appreciated by the workers who were in the field before the development of this organization and who then realized the difficulties of following up any work that might have been begun through a talk or demonstration.

The challenge of this new field of service is winning many a strong worker.

THE HEARING ON THE HOME ECONOMICS AMENDMENT TO THE VOCATIONAL EDUCATION ACT

Report of the Legislative Committee of the American Home Economics Association

On the evening of February 4, 1921, a hearing was held before the Committee on Education of the House of Representatives on the Home Economics Amendment to the Vocational Education Act. This bill is the first to be introduced into Congress, with reference only to home economics. It provides an opportunity for the development of a plan for homemaking education adequate to the needs of the women in every locality throughout the country, and authorizes an appropriation for vocational home economics equal to that amount appropriated for agriculture and trade and industrial education.

The caucus room of the House Office Building, where the hearing was held, was well filled with representatives of organizations whose interests are closely allied with home economics, and with individuals interested in the prospect of better training for girls and women in homemaking.

The American Home Economics Association has sponsored the bill from the beginning. With the aid of other women's organizations, the Association succeeded in having this amendment presented to Congress, and it is therefore with a feeling of pardonable pride that we report the congressional hearing on the bill.

Representative Fess, chairman of the Committee on Education, presided. Louise Stanley, chairman of the Legislative Committee of the American Home Economics Association, in behalf of the Association urgently recommended the passage of the bill, outlining the need for home economics education, giving the present provisions for Federal aid, and pointing out the advantages to be derived from the adoption of this amendment.

Miss Stanley's remarks may be summarized as follows:

The new bill provides an appropriation of a half million dollars for the first year, to be used for homemaking education, with an increase of $250,000 each year for the next 10 years, after which three million dollars will be available annually for this purpose. This money is not to be apportioned to the states in the same manner in which funds are now available for home economics education under the Vocational Education Act. The funds are to be allotted upon the basis of total

population, rather than upon the basis of urban population as is now the case. The money is to be expended for the salaries of teachers, supervisors, and directors of home economics; one-third of the money given for teachers' salaries must be used in part-time or evening classes for workers over 14 years of age who have entered upon employment.

In the Vocational Education Act, no definite appropriation is made for home economics; the act permits the expenditure of not more than 20 per cent of the fund appropriated for the salaries of teachers of trade, home economics, and industrial subjects, for the salaries of home economics teachers. The amount available for the salaries of teachers of home economics is allotted to the states in the proportion that their total urban population bears to the total urban population of the United States. Homemaking is a business of the rural districts as well as of the urban centers; and the 1920 census reports 32 states with a larger rural than urban population; the inference may easily be seen. There is no appropriation for the salaries of supervisors, except as supervision may be included in the plans for teacher training.

A great handicap to the program of homemaking training is found in the inclusion of home economics in that portion of the law which sets up standards for trade and industrial education. Preparation for homemaking cannot be interpreted in terms of unit trade training. Homemaking is a complex job. The efficient homemaker must be skillful in a number of simple occupations. She must understand the selection and preparation of food; she must know how to buy and repair clothing; she must be able to rear and care for children. The family expenditures, the health of her family, the standard of living in the home, and the training of the children are among her responsibilities. She is the educational manager, the health and welfare manager, and the social manager of the family group. Difficulties have therefore been encountered in the interpretation of the present law.

The need for home economics may be seen in the small percentage of the women managing the twenty million homes in the United States who have had training for homemaking. More than half of the fifty million girls and women reported by the census of 1920 are over twenty years of age; 80 per cent of these are married, and it is safe to assume that as large a proportion will marry. The chief occupation of these girls will be homemaking, and it is wise to teach the fundamentals of homemaking to all, since there are few women, whether in business or at home, who do not have some share in home duties.

The product of the home is the child. As there is no other productive enterprise that yields so valuable a product, it is important that adequate training be given those responsible for the bearing and rearing of children.

Home training is no longer a sufficient education for homemaking. In many homes there is a lack of interest or time on the part of mother or daughter, and the changing conditions of homes do not offer the old-time standards and opportunities for homemaking; these things, together with the fact that a large number of girls are employed and have no home advantages, emphasize the need for home economics courses in the schools.

Steady progress has been made in vocational training in home economics under the Vocational Education Act. In 1917, when this act was passed, only three states had laws specifically providing for vocational training in home economics. In 1919–1920, forty-four states had used funds available for the salaries of home economics teachers; two states had no available funds for home economics because the salaries of trade and industrial teachers had absorbed the entire amount. One of the largest factors in this progress of vocational training in homemaking has been the supervisor. In 1917 there were only four state supervisors; there are now forty-one full-time and twenty part-time supervisors. Every state has now some plan for supervision.

No provision is made in this amendment for teacher training; none is necessary, because the original bill provides for home economics to share in the teacher-training fund to the same extent as agriculture and trade industry. Providing the funds for the training of teachers but failing to make definite appropriation for the salaries of these teachers has created a rather anomalous situation which is not conducive to the development of vocational schools in the states, as vocational teachers are being trained who cannot be used by the states through lack of funds.

Miss Stanley made a strong plea for the adoption of this amendment on the grounds of the numbers to be benefited and the importance of the work. The American Home Economics Association, speaking for the large army of homemakers and for the potential homemakers who deserve this training for a vocation fundamental to the welfare of our national life, sees in the passage of this bill an occasion to recognize their demands and, in a measure, to equalize opportunities for the training of men and women. The fact that every organization in the country

devoted to women's interests has a home economics and a child welfare committee is sufficient proof that the women of America believe in training in homemaking. The schools have registered their approval by accepting it as part of the curriculum, and the economic world is turning to it as an effective means of eliminating waste. The National Government has recognized the vocation of homemaking as deserving of training, but has in the Vocational Education Act limited this training by an inadequate appropriation. It now remains to provide the means by which this training can be given in the states.

Mrs. Maud Wood Park, chairman of the National League of Women Voters, based her argument upon the desire of the league for equalization of opportunities for girls and boys, which would result, in this instance, from the equal appropriation provided in this bill. The development of an effective educational system was one of the chief interests of women in desiring the vote. Appropriations for all educational purposes have been insufficient. Charts prepared by the United States Bureau of Standards giving the distribution of government appropriations for the year ending June 20, 1920, were used to illustrate the meager appropriation for educational purposes. Of the five and a half billion dollars appropriated, research, education, and development received only one per cent. Of this one per cent only 13.5 per cent is given for education. Vocational education received approximately 40 per cent of the amount available for education, and home economics education received $\frac{1}{10}$ of the amount provided for vocational education, or $\frac{5}{1000}$ of the total appropriation for all educational purposes. Mrs. Wood referred to the fact that women voters are expecting the fulfillment of campaign promises in regard to the advancement of vocational training for women, since both Republicans and Democrats incorporated definite statements as to such provisions in their party platforms.

The need for systematic home economics education in rural districts is keenly felt by all interested in agricultural development. Mrs. Nellie E. Blakeman, speaking for the National Grange, urged this bill as one remedy for the limited opportunities now existing in rural districts for training girls. Six million boys and girls are now taught in one-room schoolhouses. The need for better homes exists as the need for better schools, and training for homemaking as provided in this bill was earnestly recommended.

Dean A. R. Mann of the College of Agriculture at Cornell University, who represented the Land Grant College Association, said that the lan-

guage of the present vocational education act is permissive in dealing with home economics training while it is specific towards agricultural and trade and industrial education. He said that Land Grant College extension workers believe that there is a definite need for this training in home economics, the opportunities of which will be equalized in rural and urban communities under this amendment. To be placed by the present law under the same conditions of development as trade and industrial training is a distinct drawback to home economics education, as it is clearly seen that its technique needs an independent administration.

Definite needs told by those in contact with the work itself, often speak louder than any other arguments. Edna White, speaking for the Ohio State Board for Vocational Education, said that, while her state has received the fourth largest allotment of Federal funds for home economics, the lack of money has limited the development of this work, and a large number of applications are on file awaiting this additional appropriation. This appeal from schools and communities feeling the need for home economics education for their girls and women indicates the necessity for an increase in amounts available for this work.

The million and a half women organized in women's clubs in every state and territory of the United States, and in many cities and communities of every state, sent their endorsement of this bill. Lillian Williamson, representing the General Federation of Women's Clubs, stated that the question had been studied in the different clubs and the Federation had agreed to recommend the passage of the home economics bill because they "honestly considered it worth while." The right kind of food and the proper care of children are only two of the needs demanding better home training for women and girls. Changing conditions in living have done away with the passing down from mother to daughter many of the household traditions, and this instruction must be supplied in the school. Home economics training educates homemakers along broad lines of citizenship.

Mrs. Arthur G. Watkins presented the endorsement of the National Congress of Mothers and Parent-Teachers' Association, Mrs. Ellis A. Yost that of the Woman's Christian Temperance Union, and Mrs. Robert Wiles spoke for the Daughters of the American Revolution. In the name of the Association of Collegiate Alumnae, Mrs. Raymond B. Morgan urged the passage of the bill for the reason that homemaking education should be available for every girl. Matilda J. McKeown of the

Home Economics Association of Greater New York told of the need in her state for such opportunities as would be provided through this amendment. Agnes Ellen Harris and Helen Atwater, both of the States Relations Service of the Department of Agriculture, in reply to requests for their opinions from the congressional committee, strongly recommended the bill.

The hearing on this bill constitutes a significant occasion, not only because it was without precedent that a committee of the nation's lawmakers should give their undivided attention to the subject of training homemakers, but also for the reason that this homemaking training was recognized as touching so many interests organized primarily for work outside the home. Expression from committee members as to a favorable report of the bill was unanimous. We feel greatly encouraged by the progress made yet much remains to be done. Women interested in the advancement of home economics education must continue to work if they wish Congress to act upon the bill early in the next session. That all women really want the opportunities provided in this amendment to be available for girls and women, and that the sum asked is a legitimate amount to carry on the work adequately, are the two facts now to be impressed. Let all home economics workers and all others interested be "up and doing" that the day may not be far distant when homemaking training will take the place it deserves in vocational education.

FOR THE HOMEMAKER

TEA[1]

SUSANNAH USHER

Our housekeepers are not usually discriminating buyers of tea. This is due partly to the fact that when people become accustomed to the flavor of one kind of tea, they will not accept any other, even one of a superior quality, and partly to the fact that the oriental origin of tea throws a veil of mystery over it. As we begin to study the subject this veil of mystery serves to pique our curiosity.

We must not expect to become tea experts overnight, because that is a profession by itself; but we can learn to brew tea properly, and be better judges of kinds and qualities.

It has been estimated that there are some three thousand tea brands, blends, and trade names, which seems bewildering until we know that these may be classified under three heads:

1. Unoxidized or unfermented, as green tea.
2. Partially oxidized or fermented, as oolong tea.
3. Oxidized or fermented, as black tea.

To make this classification more real let Japan pan-fired represent the green tea; Formosa oolong, the oolong; and English breakfast (China congou), the black.

Notice the characteristic color and cure of leaf. The pan-fired Japan has a medium-sized leaf, greenish in color and well twisted. The Formosa oolong has an evenly curled leaf with a somewhat crapy texture and a brownish color, with some leaves showing olive tinge. The English breakfast leaf is grayish-black to black, and well twisted.

Make a cup of each, using a teaspoonful of tea and freshly boiling water. Get the bouquet by taking some of the tea leaves on a spoon and smelling of them. Brew 3 to 5 minutes, then strain, and examine the leaves, noting the velvety green leaves of the green tea, the green leaves with coppery edges of the oolong tea, and the brownish black or reddish black leaves of the English breakfast tea. Taste the liquor when cool, as in that way one gets delicate differences in flavor.

[1] Copyright, 1921, by the American Home Economics Association.

The Japan tea will have a light color, and delicate flavor; the oolong a darker color and a very characteristic aromatic flavor; the English breakfast tea is darkest of the three, and if of good quality has a fine fruity flavor and rich deep color. The differences one notes are largely the result of differences in manufacture, but soil, climate, altitude, and kind of leaf have an influence.

The different stages in the manufacture are: picking, withering, rolling, oxidizing or fermenting, and firing or drying.

Picking. In the spring the evergreen tea bush begins to send forth its new leaves. This new growth is known as a flush. When the leaves are large enough the bud or folded leaf and several leaves are picked. Later the buds at the axils of the leaves begin to grow and form a second flush. Not all the leaves of a flush are ready to pick at the same time, so there are more pickings than there are flushes.

The quality of the manufactured tea varies according to the season of picking and the number of leaves picked. The young growing leaf contains the most soluble matter and the old leaf the most cellulose, so the older, coarser leaves make inferior tea.

Withering. If black tea is to be made the green leaf is brought in and allowed to wither naturally by being spread on open floors or racks, or, artificially, by the circulation of heated air. The withering makes the leaves soft and in condition for the next process of rolling, and begins chemical changes that go on in the later processes.

Rolling. The leaves made flaccid by withering are now rolled by hand or by machinery, and the leaf acquires its characteristic twist. Some of the juice is expressed and later dries on the leaf. This makes the juice more readily soluble when the tea is brewed, and the twist in the leaf helps keep the flavor of the tea.

Oxidation or Fermentation. The leaves are spread thinly on floors or racks in a cool, dark room and the air necessary for oxidation is admitted by tossing and turning the leaf by hand or by fans run by machinery. The oxidizing enzyme of the leaf acts readily because the leaf has been bruised and some of the sap expressed by previous rolling. Chemical changes take place during oxidation which improve the flavor and aroma of tea and reduce its astringence. The change to a darker color which begins during withering is especially noticeable during oxidation.

Firing or Drying. This is carried on in pans over a fire, or by circulating dry air in machines made for the purpose. The heat is high enough to check oxidation and drive off the moisture which assures the

keeping qualities of the tea. At this stage the final characteristic flavor and aroma of the tea are developed.

If green tea is to be manufactured the withering is omitted, as this darkens the leaf, and instead the leaf is steamed or otherwise heated to a temperature that will kill the oxidizing ferment, but not the ferments that are needed to develop flavor. The same leaf may be manufactured into green or black, but some leaf is better for one and some for the other. After steaming, the leaf is in condition to roll, which, as in the case with black tea, increases the solubility.

The leaf is then fired. By the omission of withering and oxidation the leaf retains its green color, but it has a larger percentage of tannin than black tea made of similar leaf because oxidases have not had an opportunity to act on it. This accounts for the greater astringency of green tea. The oolong tea stands between the green and the black in its characteristics because, during its manufacture, it is underoxidized.

Further research may enable the producer to so control the processes of growth and manufacture as to get more uniform results.

BREWING TEA

Okakura-Kakuzo[2] says of our afternoon tea, "Strangely enough humanity has so far met in the tea cup. It is the only Asiatic ceremonial which commands universal esteem. The white man has scoffed at our religion and our morals, but has accepted the brown beverage without hesitation. The afternoon tea is now an important function in Western society. In the delicate clatter of trays and saucers, in the soft rustle of feminine hospitality, in the common catechism about cream and sugar, we know that the Worship of Tea is established beyond question. The philosophic resignation of the guest to the fate awaiting him in the dubious decoction proclaims that in this single instance the Oriental spirit reigns supreme."

If more attention was paid to the quality of the tea and the manner of brewing, a "dubious decoction" would not be so often our fate.

Tea experts insist that there is just one method of brewing tea, which is as follows: Put the required amount of tea in a hot pot, earthenware preferred, pour on freshly boiling water, steep 3 to 5 minutes, and strain into another hot pot. Three minutes will usually allow most of the aroma and taste to be developed without an excess of tannin, which

[2] The Book of Tea. Okakura-Kakuzo. Duffield and Co.

makes the tea too astringent; in other words, in a 3-minute brewing one gets the desirable qualities with a minimum of the undesirable qualities. A 5-minute brewing gives more body.

Water freshly boiling has a life and sparkle which it loses on standing or long boiling. Water that has been boiling for some time is distinctly flat and insipid. Since the amount of tea used depends on one's taste, also on the kind and quality of the tea, no hard and fast rules can be given, but the following suggestions may be useful.

China congou (English breakfast) tea will stand one even teaspoon of tea to the half pint cup of water and a 5-minute brewing, but a 3-minute brewing will probably make a more delicate cup of tea. For weak tea one-half a teaspoon of tea is sufficient, and for strong tea the teaspoon may be rounded. China congou has less tannin than the green teas and less than the India and Ceylon black teas. This is why more tea can be used to the cup and a longer brewing is possible without undue astringency. In fact some steeping is necessary to open its tightly rolled leaves and bring out the strength.

Measuring in a teaspoon is a rough means of measuring but it is the one used in the household.

Since China green tea contains more tannin than the China black tea, more care must be exercised in the brewing. A smaller amount of tea may be used with a 3-minute brewing, although tea drinkers often want the "body" which a 5-minute brewing gives. Even an infusion of green tea is light in color when it is strong, thus deceiving one who is used to black tea.

If one likes a minimum astringency with a delicious aroma and piquant flavor, a 3-minute brewing of Formosa oolong is sufficient. From ½ to 1 teaspoonful may be used according to taste.

As India and Ceylon teas contain more tannin than China teas, ½ teaspoon and no more than a 3-minute brewing should be used unless a strong tea is desired. This is especially true of the heavy bodied teas, such as Darjeeling and Assam. It is important to strain the liquor from the leaves as soon as the 3 or 5 minutes is ended.

The heavy bodied teas are especially good with cream. If served for afternoon tea with lemon they should be made weaker than when served with cream at meals. Japan greens may be given a 3- to 5-minute steeping and ½ to 1 teaspoon of tea to the cup.

Tea may be made with water below the boiling point. This is the practice in some oriental countries. This makes a delicately flavored

tea. Boil the water, take from the fire and allow to cool slightly, then pour on the tea, let stand 3 to 5 minutes, and strain.

Strainers and Tea Balls. When guests are arriving intermittently it is convenient to make tea in a strainer placed over a cup. But aside from its convenience, this method has little to recommend it. For, when tea does not have time to steep and is used for several cups, the color is all that is left to remind one of tea. If the strainer is used the tea should be often renewed, and a kind should be used that parts quickly with its goodness. Ceylon or oolong is better suited for this purpose than English breakfast tea which needs steeping to bring out its flavor.

A tea ball should be used with caution. Never fill it so full of tea that the water cannot penetrate. For the best results, fill the ball about half full of dry tea, as the tea will swell when the water is added. If the ball is to be dangled in a succession of cups of hot water, it should be emptied and refilled before the flavor and aroma are dissipated.

Various other methods are used by which the leaves may be removed from the liquor when the tea is sufficiently steeped. Muslin bags may be made which will hold the required amount of tea. These should be scalded and dried thoroughly, filled with tea, and put in a tight receptacle. As the bags have strings attached to them, they may be removed from the pot at the proper time. This method is used in some hotels and tea rooms,—but it apparently does not suit everyone, for a man served in this fashion was heard to remark, "I have found cloves, lemon, or rose leaves in my tea, but never before have I found a rag."

In tea room work, teapots with strainers may be used. After the first cup is poured, the water is reduced so that the leaves are no longer covered. If some such device is not used the second cup of tea is too bitter. When the pot of tea is made fresh for each person, the customer does not seem to realize that he must let the tea steep before pouring or the tea will be too weak; or he may let it stand too long and the tea will be too strong.

Points to be remembered in brewing tea: Measure carefully. Have the water freshly boiling. Have two hot earthen pots. Steep three minutes. Never boil tea. Strain leaves from liquor. Keep hot in tea cosey or where tea will not boil. Tea served with cream should be stronger than tea served with lemon.

(*To be continued.*)

THE EIGHT-HOUR DAY IN OPERATION

GEORGIE BOYNTON CHILD

This article is part of a series of "studies" on the employment of non-resident workers in private homes. The first of these articles "The Six Hour Day for Housekeepers" appeared in *The Delineator*, July, 1919; a second, "Planning the Eight Hour Day" was published in the November issue of *The Delineator* the same year. Other studies were to have followed but the topics were changed at the request of the editor. The studies are based on careful records of the duties performed by various resident and non-resident employees in my home during the past sixteen years. During half the time I employed help according to the conventional plan. For the last half I experimented with different plans, employing non-resident workers chiefly. The first study shows how well, under certain conditions, a combination of resident and non-resident help will work out. In homes where there are very young children, or invalids, or old people, it is very desirable to have one resident worker of responsibility and refinement. Such a person can carry light duties but is not usually physically able to put in long hours or to do the energetic kind of work required of the general houseworker. A happy home means much to such women. If housekeepers would realize this and be willing to organize their housekeeping so that such workers could command a certain amount of freedom, and not lose caste by undertaking the work, there would be found many to fill the positions of resident caretakers at nominal pay. Strong, capable women, who can do a good day's work command high wages.

I have not found the supply of employees fail me even during war-times, although changed conditions have made it advisable to adjust hours and increase the pay. During the years covered by those studies I have always been able to command at least three hours of uninterrupted time in the mornings for study, writing, or professional consultation, and to devote an unusual amount of time to the supervision and interests of my four children, the youngest of whom is now five. The wages paid for the service have varied between $7 a week and $13, the latter amount covering two part-time workers, one of whom was paid $9 per week of six days and the latter $4 for extra work required. There have been no extra "incidental expenses" to figure in, as is the case with resident workers where room-rent, light, heat, three meals a day, and waste in preparing meals must be added to the $50 or $70 a month now paid for average service. I have included dinner each day, so the cost of materials must be added to the wage, but this did not figure more than $1.50 a week extra and added a great deal to the contentment of the worker. By the non-resident plan the housekeeper has to keep a close hand on supplies, so there is no opportunity for careless or negligent management on the part of either mistress or maid.

Yes, the eight-hour day for houseworkers is really a success. Housekeepers who have tried it like it because it brings to the home a superior class of workers—women of all-round ability who are willing to put in their time at any household task. The workers like it because they have a short day of concentrated but varied work. They are independent and free to make their own plans during the hours they are off duty. Best of all they can keep up their own homes or live in boarding houses with their friends.

This new basis does away with the idea that one is hired to do cooking but not wait on table, or to make beds but not to iron. The worker lays aside the demands of specialized labor and agrees to be of service eight hours a day at any task, whether it be cleaning, cooking, serving meals, ironing, sewing, or the care of the children. Gardening and light washing are often included in the tasks that may be assigned.

The worker benefits by the variety of work as much as does the housekeeper. Varied work is not so monotonous and wearing as repeating over and over the same kind of tasks. Under this new arrangement the worker obtains one free day a week and all her holidays. Best of all, she is no longer regarded as a servant but is called by her surname and title, just as she would be if she were working in a shop or office.

No Shortage of Household Workers in War-time. A friend of mine became interested in this new basis of employing domestic help, when war work was making its most tempting and attractive offers. She put an advertisement in the city paper which read as follows:—"Wanted, a woman to assist with housework five hours a day, six days a week, at twenty-five cents an hour." She did not expect many applicants. The intelligence offices had all assured her that there was no household help to be had. That was what determined her to strike out in this new direction. Much to her surprise, she was flooded with applicants. Over a hundred women applied, and one man.

After a personal interview with the most promising applicants, my friend made her selection. The plan was working very successfully when she was called away from home by the illness of a sister and had to give up housekeeping temporarily. On her return she decided to adopt the same general arrangement again, increasing the time to eight hours a day. She secured the second assistant from the list of names filed in answer to her first advertisement. The new incumbent had been a practical nurse. She agreed to come eight hours a day, six days a week, and three hours on Sunday.

The hours were divided into two shifts, from 9 a.m. to 2 p.m. and from 4.30 p.m. to 7.30 p.m. The arrangement included two meals daily for the worker, which is not the usual practice when help is engaged on this basis. The woman agreed to work for $8.00 a week, including three hours on Sunday. This price is equivalent in value, to a worker without a home, to $14.00 a week when no meals are included, but in cases where workers live at home without paying board it would not be of this comparative value. The woman was not especially trained for her work, and was not expected to take charge of the cooking. It did not take long, however, to give her the necessary training, and the arrangement proved very satisfactory on both sides.

Conditions To Be Met. This friend is a doctor's wife, living in a big house in a Connecticut city. She is a woman who has kept up with all the modern ideas about housekeeping and is herself a capable housekeeper and manager. The family consisted of four members—the doctor, his wife, his son, and a young girl who was spending the winter with them. The doctor had his office in the house, which added considerably to the housekeeping problems. The house is large, of an old-fashioned type, with very high walls, and full length windows, requiring an immense amount of work to keep it clean. It used to have a big, rambling, impossible kitchen with pantries adjoining.

Before employing non-resident help, all the working conditions were made as perfect as possible. The heavy labor was reduced to a minimum by covering the floors of the big kitchen and pantries with linoleum. The most important operations of the kitchen were concentrated in one corner, so there was no loss of steps between the sink, the stove, and the mixing center; the refrigerator was brought into the kitchen from a distant pantry. In its new location it was conveniently placed with relation to both the dining room and the mixing center. A large coal range which had always been run very wastefully by the help, was replaced by a gas range. A fireless cooker was installed.

A wheeled tray reduced the labor of the long journeys back and forth between the dining room and the kitchen. Labor-saving equipment for every kitchen task was purchased to lighten the work and save all possible time. This extended beyond the kitchen to laundry apparatus and a vacuum cleaner. In this way all the necessary work was reduced at least one half.

My friend likes cooking and it seemed important to keep the work under her direct control and supervision, because the arrangement was

economical and because her husband had to have his food very carefully prepared. It was possible to secure a laundress who came in two days a week for the washing and ironing and one day for extra cleaning. The doctor employed an office girl who took charge of the door and telephone during office hours, as well as the daily cleaning of the office suite. Her hours were from 10 a.m. to 12.30 p.m. and again from 1.30 to 5 p.m. She was on duty also two evenings a week. The services yet remaining could be performed by one competent woman. A large part of this worker's time was devoted to the daily care and cleaning of the kitchen suite and the upstairs rooms. She also attended to setting the table and the routine part of the cooking, as well as serving luncheon and dinner.

How the Work Was Planned. The assistant came on duty at 9 o'clock. Breakfast was prepared by my friend, the mistress, assisted by the young girl. The dishes were scraped and stacked on the wheeled tray, ready to be washed. The assistant washed the dishes, tidied up the kitchen, washed out the kitchen towels, and gave the dining room a thorough daily cleaning. By 10 o'clock she began the upstairs work, making beds in four rooms, taking care of bath rooms and halls and performing all the little tasks included in the upstairs routine of an orderly household.

This work was always completed in an hour, and often in less time. The balance of the time not required for the preparation of lunch was spent in the weekly cleaning of some special room. The rest of the weekly cleaning was done by the laundress on the regular cleaning day. The lunch was then prepared and served, the dishes washed and everything put in careful order before 2 o'clock, when the assistant went off duty.

At 4.30 p.m. the assistant returned to prepare and serve the dinner. This proved to be a convenient time for my friend to do the baking, dessert making, and all extra cooking, as she could then be helped by the assistant. Three hours a day were found to be ample to allow for preparing and serving dinner and for the extra cooking. The assistant cleared up afterward and was through for the evening by 7:30.

It will be noticed that the division of hours between 9 a.m. and 7.30 p.m. was so arranged that either the assistant or the office girl was on duty to answer the door and telephone, a point quite necessary in a doctor's family.

Eight-Hour Plan a Success. My friend tells me that they have never liked any arrangement so well as the present plan. The house has never been so well kept up. All the little things that are often overlooked by resident helpers are now thoroughly done. The worker is genuinely an assistant. The mistress is free to call upon her for help in any task, at any time, as she was not when she kept two maids and followed the conventional division of housework. There is much more freedom in planning the work now that she does not have to consider whether it "comes within the bond" to do this or that task. The keynote of the plan is coöperation and the spirit of service.

This experiment is of interest and value to all housekeepers because it illustrates the progressive, unconventional way of solving one's housekeeping problem. The business arrangement between the housekeeper and the worker meets the needs of both parties. It includes the essential points in the employment of both resident and non-resident help.

The rate of pay per week is based on definite hours of service. Everything has been done to make the conditions of work easy and pleasant. It is a decided advantage to the worker, in this instance, to have two meals a day at her employer's home. It would be very difficult for her to have such wholesome, appetizing meals as she gets here without paying a very high price for them. Home-cooked food cannot be estimated at restaurant prices. If the conditions on either side were different, however, it might be better not to have meals included in the arrangement, but to pay a higher price in cash. In the same way it might be fairer to the worker not to expect her to do any work on Sunday.

These are matters that ought to be adjusted to individual needs. The important point to consider in this relation, as in all business matters, is to have the working agreement fully understood on both sides and based on the best interest of both employer and employee.

EDITORIAL

The International Federation of Home Economics Instruction and the Third International Congress of Home Economics Instruction. The American Home Economics Association last June voted $25.00 to be paid to the International Federation of Home Economics Instruction, and thereby became a member of the federation. Definite information regarding the organization of this, the only international organization dealing primarily with home economics subjects, will therefore be of interest to members of our Association.

According to the constitution, the aim of the federation is to encourage the development of home economics instruction in all countries by means of coöperation with public agencies, scientific and professional organizations, and individuals. Its membership includes official representatives of governments granting an annual subsidy, as well as individuals, institutions, and associations interested in home economics instruction.

The governing bodies of the federation are the Plenary Assembly, the Permanent International Committee, the Executive Committee, and the International Office of Home Economics Instruction.

The Plenary Assembly of members is held every four years, at the time of the international congress.

The Permanent International Committee acts for the assembly between such meetings. It consists of a delegate from each government and association contributing to the federation and of one representative for every 50 members in each country, such representatives nominated from among the individual members and elected by the Plenary Assembly. In order to maintain active connection with the federation a corresponding member and an alternate are appointed by the delegation from each country. The Permanent International Committee meets regularly before the opening of the congress and on special call by the president or at the request of three countries. It nominates the executive committee and draws up the rules governing the congresses.

The Executive Committee consists of from 5 to 9 members and has the general direction of the work and expenditures of the federation, including the International Office of Home Economics Instruction.

This office, established in 1908, has its seat at Fribourg, Switzerland. It is under a director, M. Leon Genoud, who is also secretary of the federation and is appointed by the executive committee. He and his staff carry out the decisions of the executive committee, collect and distribute information, maintain a library and bibliography of home economics publications from all countries, and encourage the study of questions to be placed on the programs of future international congresses.

The federation is supported by subsidies from governments and associations, by the dues of individual members, and by gifts. Each government granting an annual subsidy and each association paying 100 francs per year is entitled to at least one representative on the international committee. Annual dues of individual members are 5 francs. Life membership is secured by the payment of 100 francs, and associations or individuals making a gift of 1000 francs are to be listed as founders. Application for membership should be sent to the Office International de l'Enseignement Ménager, Fribourg, Switzerland.

Although the United States Government, unlike most European governments, does not grant subsidies to such international organizations, but leaves their support to private initiative, Dr. C. F. Langworthy of the Department of Agriculture has been a member of the Permanent International Committee since the federation was organized.

The Third International Congress of Home Economics Instruction has been called at Strasbourg, Alsace, for July 28 to 31, 1921.

The organization and procedure of the congress are somewhat different from those usual in professional gatherings in this country, as appears from the rules recently drawn up for the government of the congress.

The Permanent International Committee, having chosen the plan of the congress, appoints a National Committee on Organization composed of persons from that country and of the secretary of the federation and entrusts to this committee the task of arranging for and financing the congress. It is aided, in details of arrangement, by a local committee in the city where the congress is held.

Membership in the congress consists of the delegates of those governments, municipalities, institutions, or corporations, paying a fee to be fixed by the committee on organization, and of individuals registered with the local committee who shall have paid a fee similarly fixed. Thus membership in the federation does not, in and of itself, entitle to membership in the congress, nor is membership in the congress limited to members of the federation. Each delegate and individual member whose fee

to the congress has been duly paid, receives a membership card which entitles him to take part in the deliberations of the congress. Visitors cards will also be issued to non-members at a price fixed by the committee.

The working sessions of the congress include general and sectional meetings. They are under the direction of the Board of Officers (*Bureau*) elected at the opening session. This board determines the final form of the resolutions and conclusions adopted by the sections and presents them at the closing session of the general assembly as the conclusions of the work of the congress, to be later published by the international federation.

The way in which the program of the sessions is drawn up and carried out is perhaps the part of the proceeding least like our own. On the basis of suggestions presented by the Director of the International Office, the Permanent International Committee adopts a program of topics for discussion by the congress. Individual contributions to these discussions are presented in advance to the National Committee on Organization, and this committee appoints competent editors or reporters (*rapporteurs*) to condense these into general reports on the various topics. These general reports, printed in the original language and accompanied by résumés in the other languages admitted by the congress, are sent out four weeks before the date of the congress, to all who have paid the membership fee of the congress. At the sessions of the congress, each reporter opens the discussion of the question assigned to him, after which other members may join in. Discussion is confined to the topics specified on the program and is limited to thirty minutes for the reporter and ten minutes for other speakers, and no person may speak more than twice on the same subject without the consent of the officers of the section. Speeches are as far as practicable translated into the admitted languages, and it is requested that a written résumé of each be handed at once to the secretary.

The national committee arranges for the publication of the report of the congress and copies are sold on subscription. This report contains the proceedings of the congress and the resolutions adopted.

TOPICS PROPOSED FOR CONSIDERATION AT STRASBOURG

I. Home Economics Instruction in Different Countries Since the Congress at Ghent (1914)
   Situation before the war
   Situation during the war
      Increased participation of women in national life by replacing mobilized men; established facts

How have the home economics schools survived and how did they function during the war?
Were they subsidized by national or local governments?
How were they adapted to special circumstances and what state and local services did they render?
Did government authorities appreciate such services and how was such appreciation shown?—Results (greater participation of women in political, economic, and social life)
Present situation
General reconstruction; rôle of women and home economics instruction (simplification of household labor)

II. Home Economics Instruction in Primary Schools
How and when should home economics instruction be given to girls in the primary schools?
Is specially installed equipment necessary for this instruction?
What should this equipment be in city schools? in the country?

III. Home Economics Instruction as a Part of the General Education of All Girls
Should home economics instruction be required in secondary schools for girls?
How and when should home economics instruction be given in secondary schools for girls?
Is special equipment needed for each school giving such instruction?
What specially installed equipment would be needed in city schools? in the country?
Home economics instruction for boys

IV. Home Economics Science in the Universities
Introduction of subjects bearing on the science of home economics into university research laboratories

V. Relation of Home Economics Instruction to Education in the Home
How may parents be shown the value of home economics instruction?

VI. Relation of Home Economics Instruction to Professional Education

VII. Agricultural Schools of Home Economics
Means and methods of making home economics instruction efficacious in rural districts

VIII. Post-scholastic Instruction in Home Economics
Special instruction for girls; travelling schools; courses in child care and training

IX. Normal Instruction in Home Economics
How may courses be organized for the rational preparation of a teaching force in home economics science?
The importance of the formation of such a teaching force
Home economics pedagogy
Should home economics instruction be by the individual, group, or mutual [groups of pupils taught by pupil-teachers under supervision of the instructor] method?
What special equipment should be provided for such instruction in normal schools of home economics?

X. Inspection of Home Economics Instruction
Duties of inspectors

XI. To What Extent Can Home Economics Schools Aid in the Improvement of Social Conditions from the Point of View of Housing, Food, Child Hygiene, Coöperative Organizations of Consumers, High Prices, Food Adulteration?

XII. Professional Training of Servants in the Family (Required Examination)
Professional orientation
General management: Organization, science, and simplification of domestic labor

BOOKS AND LITERATURE

Text Book of Chemistry for Nurses and Students of Home Economics. By ANNIE LOUISE MACLEOD, Associate Professor of Chemistry, Vassar College. New York: McGraw Hill Book Co., Inc., 1920, pp. 192. $2.25.

The purpose of this book is "to present in one volume those general principles of chemistry, inorganic, organic, and physiological, which give the necessary foundation for practical courses such as nutrition, dietetics, and cookery, materia medica and bacteriology, which are more or less distinctly dependent on a basis of chemical theory."

Inorganic chemistry is treated in the first 71 pages comprising ten chapters. The next 34 pages, divided into eight chapters, are devoted to organic chemistry, followed by 34 pages of physiological chemistry under the chapter headings, Digestion, Assimilation, Energy of the Body, The Blood, Excretions of the Body. The last part of the book is devoted to a practical manual including 22 exercises intended to give the beginning student some skill in manipulation, and a first hand acquaintance with some of the principal substances studied.

It is very evident that, in a book of this size, covering such a wide field, only the most essential substances and principles of chemistry can be taken up.

The author has carried out well her object of eliminating "much that would be included in the conventional chemistry course in order to avoid confusing the student who has only a limited amount of time to spend on this subject." Indeed it seems that some material has been eliminated which can hardly be excluded, even from a book of this scope. Dismissing such important elements as phosphorus, sulfur, calcium, potassium, and sodium with only incidental mention in other chapters seems hardly excusable, and calcium and phosphorus at least should have been included in the list of most important elements. The chapter on the metals is disappointing, being chiefly a recitation of the physical properties of the metals in common use. No mention is made of the chemical behavior of the typical metals of the alkalies and alkaline earths. In the chapter on the paraffins some mention might well have been made of crude petroleum and its distillation products and of the important substances paraffin and vaseline.

There are some misprints and a number of inaccurate and misleading statements. We learn on page 62 that the boiling point of water is 180°F. and on page 145 that "blood heat is about 27°C." The first equation on page 92 is not balanced. Hydrogen is no longer taken as the basis of our atomic weight as the reader is led to believe on page 6. It is hardly correct to say that the "kindling point" of small pieces of kindling is lower than that of larger sticks of wood as is stated on page 14. The statement on page 62 in regard to the decomposition of ammonium salts leads the reader to expect ammonium chloride to give a strong odor of ammonia. The definition of a calorie on page 128 seems hardly satisfactory. It is to be hoped that these and other inaccuracies may be corrected by the author, as they detract from the value of the book which is entertainingly and on the whole clearly written, containing information indispensable to the well trained nurse.

It is doubtful if the treatment of the subject is extensive enough for the book to find a place in the average university or college course in home economics. An extensive index and a list of the supplies necessary for carrying out the laboratory experiments are desirable features.

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BIBLIOGRAPHY OF HOME ECONOMICS

CURRENT PERIODICAL LITERATURE

COMPILED BY MARGARET NORTON

Food

Digestibility of Some Hydrogenated Oils. A. D. Holmes and H. J. Deuel, *Amer. Jour. Physiol.*, Jan. 1921.

Experimental Studies in Diabetes, Series II. The Internal Pancreatic Function in Relation to Body Mass and Metabolism; 7. Influence of Cold, F. M. Allen; 8. Influence of Extremes of Age Upon the Production of Diabetes, F. M. Allen; 9. Influence of Pregnancy Upon Experimental Diabetes, F. M. Allen. *Amer. Jour. Physiol.*, Jan. 1921.

Bracken Rhizomes and Their Food Value. James Hendrick, *Chem. News*, Dec. 31, 1920.

Critique of Experiment With Diets Free From Fat-Soluble Vitamine. T. B. Osborne and L. B. Mendel, *Jour. Biol. Chem.*, Jan. 1921.

Cultivation of Yeast in Solutions of Purified Nutrients. M. B. MacDonald and E. V. McCollum, *Jour. Biol. Chem.*, Jan. 1921.

Iodometric Determination of Copper and Its Use in Sugar Analysis. P. A. Shaffer and A. F. Hartmann. I. Equilibria in the Reaction between Copper Sulfate and Potassium Iodide. II. Methods for the Determination of Reducing Sugars in Blood, Urine, Milk, and Other Solutions. *Jour. Biol. Chem.*, Jan. 1921.

Chemistry of Vitamines. Atherton Seidell, *Jour. Indus. Chem. Engin.*, Jan. 1921.

Heat Resistance of Spores with Special Reference to the Spores of B. Botulinus. H. Weiss, *Jour. Infec. Dis.*, Jan. 1921.

Vitamines, Appetite, and Digestion. Editorial. *Jour. Amer. Med. Assn.*, Jan. 1, 1921.

Nutritional Requirements of Yeast. I. Rôle of Vitamines in the Growth of Yeast. II. Effect of the Composition of the Medium on the Growth of Yeast. E. I. Fulmer, V. E. Nelson, F. F. Sherwood, *Jour. Amer. Chem. Soc.*, Jan. 1921.

Story of the Prune. G. Orb, *Sci. Amer.*, Jan. 15, 1921.

Recent Developments in Child Feeding. Mary S. Rose, *Teachers Coll. Rec.*, Nov. 1920.

Shelter

Furniture of the Low Countries. W. G. Blaikie Murdoch, *Good Furniture Mag.*, Jan. 1921.

Antiques and Antiquing. R. F. Bach, *House and Garden*, Jan. 1921.

General

German Vegetable-Fiber Industry. *Chem. and Metallur. Engin.*, Dec. 22, 1920.

Dye Industry [English]. *Nature*, Dec. 9, 1920.

Some Economics in College and University. David Snedden. *School and Soc.*, Jan. 15, 1921.

Mills in the Tropics. R. J. Blackham. *Lancet*, Dec. 4, 1920.

Study of the Relation of Family Income and other Economic Factors to Pellagra Incidence in Seven Cotton-mill Villages in South Carolina in 1916. Joseph Goldberger, *U. S. Pub. Health Reports*, Nov. 12, 1920.

NEWS FROM THE FIELD

The New England Home Econonics Association has presented the following calendar. Its basic subject is The Relation of Home Economics to Health.

The first meeting, held October 23, introduced the year's work by reports of conditions abroad and a suggested plan for health work in public schools. Mary McSkimmon, President of the State Federation of Teachers' Clubs, spoke of the great faith and courage of the women of France and Belgium and urged that American women should do their utmost to carry the country safely through the coming hard winter. Mabel C. Bragg, Assistant Superintendent of Schools, Newton, outlined the Health Program in the Newton Public Schools. She feels that the home economics teachers can do much to improve the health of the children in the public schools. Mrs. Schuyler F. Herron, Director of the Home Department of the Eastern States Exposition, outlined the work and purposes of the exposition.

The second meeting, held November 13, had a large attendance. Intense interest was shown in Mabel Todd's explanation of why so many women, and men too, are inefficient machines. Physical balance she affirmed was fundamental to mental balance. With diagrams, photographs, and a human pelvis she made clearly evident the need of proper posture both in standing and in sitting.

Mrs. Ida Harrington showed the relation of posture to form and health and their relation to attractiveness. She told, in detail, how to make "Betty" your own dress form. The construction of "Betty" is not difficult and her use by the home dressmaker needs to be encouraged as a measure toward economy and beauty.

The Clothing Bureau, Boston, showed how its efforts were applied towards Standards in Dress, in buying, in overcoming difficulties in shopping, and in other helps for the buyer.

An appeal came from the Children's Hospital telling how individuals, groups, and schools could coöperate their sewing and other hand-work lessons with the hospital in supplying constantly needed articles. A standard set of samples is furnished.

At the third meeting, December 11, the subject was The Development of Home Economics under the Smith-Hughes Act and Needs in the Field Making the Passage of the Fess Bill Important.

Deputy Commissioner Small, Massachusetts Department of Education, paid tribute to the good work done through home economics during the war, presented the greater needs and opportunities of the present, and urged redoubled zeal. He said educational opportunities must be increased until every individual is reached. Education in home making should be given to every child in the regular schools, but after and beyond school age there should still be individual opportunity to study the problems of the home. Massachusetts allots 20 per cent, or one fifth, of the Smith-Hughes appropriation for home economics teaching. Each community receives its aid on a pro rata basis. The Smith-Hughes money then enables the community, not only to lengthen the time for study, but to broaden and deepen its possibilities.

Mr. Redman, Assistant Director of Extension Service in Massachusetts, and Minnie Price, Home Demonstration Agent for Hampden County, Mass., showed how the provisions of the Smith-Lever Act were carried out in the counties through the fol-

lowing projects: Household Management, Food Preservation, Health, Clothing Efficiency, Nutrition, Milk Campaign, Dental Clinics, Nutritive Group Study, Fly Campaign, and Community Tours. Kitchen equipment was studied by some groups. In New England the work is done in coöperation with some county organization. In Massachusetts during the year ending November 30, more than 150,000 persons have participated in some form of home economics study and practice.

Mr. Redman emphasized the evident need of training extension workers in writing good reports. His advice, "Learn how to make a good report of your work," should be an integral part of teacher training. Miss Price's excellent report showed the high standard which may be reached. While so much is accomplished a large field is still barren because of too little money. Therefore is seen the importance of "our bill," the Fess Bill or Amendment, which, when adopted will place vocational home economics on a par with agriculture and trade and industry in the amount of money allotted.

Adelaide Steele Baylor, Federal Board for Vocational Education, came from Washington to tell of their outlook and achievements. To establish a democracy homes are necessary for its citizenship. Homemakers are carrying on a vocation. Their jobs need to be analyzed, which requires extended research. Teachers need contact with the vocation, and must therefore go into homes and work under supervision. Expert supervision is not now provided because of lack of funds. The application of these three acts—Smith-Lever, Smith-Hughes, and the Fess Amendment—should give to each home and each community a richer, freer, fuller life. By such a life is assured the life of the Nation.

The Washington (D. C.) Home Economics Association has planned to hold a meeting once every two months. At these meetings the home economics people of this section have become acquainted with each other, have made themselves familiar with each other's problems and plans, and have made an effort to keep abreast of some of the newer movements of interest to women. Some of the meetings have been devoted to mere social good times.

The December meeting was addressed by Mrs. Philip North Moore on the subject "Some Glimpses of the International Council of Women Meeting in Christiana," and by Jeannette Rankin on the "Sheppard-Towner Bill." At the last dinner, which was the bi-monthly meeting, there were one hundred and ten home economics people present.

Mrs. Henrietta Calvin is president and Miss Ridgway secretary.

NOTES

Mary E. Sweeny, President of the American Home Economics Association, is now Dean of Home Economics Michigan Agricultural College, East Lansing. Miss Sweeny was formerly Head of the Home Economics Department of the University of Kentucky, and in charge of Home Economics Extension Work. She had been connected with the University of Kentucky since 1912. During the years 1918 and 1919, she served over seas with the American Army in the Canteen Service of the Y. M. C. A.

Miss Frances Zuill, instructor in the Department of Household Arts Education at Teachers College, Columbia University, has been appointed Supervisor of Home Economics in the Public Schools of Baltimore, Maryland.

Maud E. Hayes, formerly Specialist in Home Economcs Extension Service, Connecticut Agricultural College, Storrs, Connecticut, is now Supervisor of Home Economics in the Long Beach City Schools, Long Beach, California.

Flora G. Orr has resigned from the editorial staff of *The Delineator*, her work ending with the March issue. Miss Orr went to *The Delineator* directly from editorial work in the Food Administration.